U. S. Government

RESEARCH REPORTS

February 17, 1956
Vol. 25, No. 2

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U. S. DEPARTMENT OF COMMERCE
Office of Technical Services

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U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

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CHEMICALS AND ALLIED PRODUCTS

Plastics and Plasticizers

Adhesive for composite material used in printed circuitry, by Russell M. Houghton and Virgil Lorenzini. Houghton Laboratories, Inc., Olean, N. Y. Contract DA 36-039-sc-42708. Dept. of the Army project no. 3-93-00-503. Signal Corps project no. 2005D. Order separate parts described below from LC, giving PB number of each part ordered.

First quarterly progress report for period Mar 15, 1953-Jun 15, 1953. Jun 1953. 16p table. Mi $2.40, ph $3.30. PB 118939

1. Adhesives - Plastic-to-metal 2. Adhesives, Plastic - Evaluation 3. Adhesives, Plastic - Electrical properties 4. Plastics, Laminated - Gluing 5. Circuits, Electronic - Printed - Adhesives.

Second quarterly progress report for period Jun 15, 1953-Sep 14, 1953. Sep 1953. 22p tables. Mi $2.70, ph $4.80. PB 118940

1. Adhesives - Plastic-to-metal 2. Adhesives, Plastic - Evaluation 3. Circuits, Electronic - Printed - Adhesives 4. Plastics, Laminated - Gluing.

Flexural tests of structural plastics at elevated temperatures, by John E. Wier and Dorothy C. Pons. U. S. National Bureau of Standards. Jan 1954. 68p graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 119102

Flexural strength and modulus of elasticity at elevated temperatures were determined on 1/8 inch thick glass-fabric laminates bonded with three types of commercially-available heat resistant resins. The laminates were exposed to temperatures of 300, 400, 500, 600, and 700°F for periods ranging from one-sixth of an hour to 1000 hours. The tests were made at the elevated temperatures. Loss of weight due to exposure to elevated temperatures was also determined. AF WADC TR 53-307.

Investigation and development of high-temperature structural adhesives, by H. N. Homeyer, Jr., J. H. Preston, and K. L. McHugh. Connecticut Hard Rubber Co., New Haven, Conn. Aug 1954. 120p photos, drawing, graphs, tables. Order from OTS. $3. PB 111768

1. Adhesives - Metal-to-metal 2. Adhesives, High temperature - Tests 3. Adhesives, High temperature - Preparation 4. Resins, Silicone - Adhesive properties 5. Contract AF 33(616)-427 6. AAF WADC TR 54-98.

Parallel glass fibre reinforcement for plastic laminates. Final report on Contract NOrd 14703. Firestone Tire & Rubber Co. Defense Research Division, Akron, Ohio. Mar 1955. 32p photos, diagr, tables. Order from OTS. $1. PB 111719

A narrative summary is presented of the pilot plant production of parallel glass fibers, the materials are defined and the procedures outlined. Experiments are described in the molding and testing of parallel glass fibers into (1) edges and corners, (2) honeycomb sandwich construction, (3) reinforced plastic tubing and (4) body armor. Contract NOrd 14703, Final report.

Post-molding shrinkage characteristics of some thermosetting plastic molding materials, by Steven T. Marshall and Charles F Ellis, Jr. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1953. 29p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119042

The dimensional stability as to post-molding shrinkage of commercially available melamine, phenolic and polyester plastic molding materials was investigated by means of accelerated conditioning procedures which produced shrinkage corresponding to that obtained on parts in service in long-time aging. It is concluded, that of the materials tested, the polyester mineral filled molding material demonstrated the greatest degree of dimensional stability. AF WADC TR 52-142.

Paints, Varnishes and Lacquers

Measurement and evaluation of luminous material, by L. H. Dawson. U. S. Naval Research Laboratory. Dec 1955. 62p photos, diagrs, graphs, tables. Order from OTS. $1.75. PB 111785

This report gives an account of the origin and growth of the interest by the U. S. Navy in phosphoresent and fluorescent material and describes the development of applications to aid military activities, together with procedures and instruments for evaluating the properties of such material. The levels of luminance encountered in the use of luminescent material are given and the various units of measurement that have been used are defined. The development of both the visual and photoelectric low-luminance photometers and methods for use are discussed. NRL R 4655.

Tropical performances of fungicidal coatings, Part II, by J. M. Leonard and J D. Bultman. U. S. Naval Research Laboratory. Jul 1955. 9p tables. Order from OTS. 50 cents. PB 111788

Under the natural conditions of a Panama jungle the abilities of six different fungicides to suppress fungus growth on varnish films have been examined. The toxicants were studied singly and in binary mixtures. The results confirm an earlier experiment which shows p-toluene sulfonamide to be of superior merit. NRL R 4563.

Use of radioactive self-luminous markers as sources of illumination, by L. J. Boardman. U. S. Naval Research Laboratory. Jul 1955. 24p graphs, tables. Order from OTS. 75 cents. PB 111746

Experiments were made using single markers and groups of markers in a variety of colors, luminances, and distances. Green markers are the most efficient illuminators since the spectral energy distribution of the light from green markers has its maximum at about the same wavelength as the maximum of the sensitivity curve of the dark-adapted eye. The distributed luminance of a white wall, illuminated by various groups of markers, was measured to show the extent of useful illumination. Various tests revealed many uses that are possible. NRL R 4546.

Inorganic Chemicals

Quarterly periodic status report of the Hydrogen Peroxide Laboratories, by R. L. Wentworth. Massachusetts Institute of Technology. Hydrogen Peroxide Laboratories. Dec 1954. 8p. Order from LC. Mi $1.80, ph $1.80. PB 119030

DIC 6552. For other quarterly reports see PB 115065, 116706, 116709.
1. Hydrogen peroxide - Thermodynamic properties 2. Hydrogen peroxide - Stability 3. Hydrogen peroxide - Decomposition 4. Hydrogen peroxide - Analysis 5. Barium peroxide - Reactions 6. Barium peroxide - Thermal properties 7. Flame velocities 8. Contract N5ori-07819, NR 092-008.

Ordnance Chemicals

Development of processes for recovering RDX from compositions A-3 and C-3, by Abraham Lechinsky. U. S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N J. Apr 1955. 22p photos, diagr, tables. Order from LC. Mi $2.70, ph $4.80. PB 119140

Ordnance project WD OAC 4700 1420-19-99105.
1. Explosives, Plastic 2. Hexogen - Production 3. PA TR 2154.

Isothermal decomposition of TNT, by M. T. Abegg and M. A. Cook. Utah. University. Institute for the Study of Rate Processes. Explosives Research Group, Salt Lake City, Utah. Dec 1954. 24p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119086

Equipment was designed and constructed which made possible the investigation of TNT liquid-phase and vapor-phase decompositions separately. No measureable vapor-phase decomposition occurred over the temperature range from 250° to 301°C, and the pressure range from 35 to 540 mm Hg. The liquid-phase decomposition over the same temperature range was measured and found to be first-order until the onset of autocatalysis. Technical report XLII under Contract N7-onr-45107, Project no. 459-239. UU ISRP TR 42.

Study of the stability of MI powders in an atmosphere of 95% relative humidity at 80°C, by W. T. Ingraham. U. S. Picatinny Arsenal. Technical Group, Chemical Dept., Chemical Research Laboratories, Dover, N. J. Jan 1935. 18p diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 118681

"MI" should be substituted for "FNH." This is the first progress report. Test values for various types of propellants are given in comparison with test values for the same powders at 50°C and 100% relative humidity. First progress report. Problem 502.6-58 (Stab. FNH Powd.) 121. PA TR 579.

ELECTRICAL MACHINERY

Electronics

Antenna scanning problems in radio astronomy, by Roy C. Spencer. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Antenna Laboratory, Cambridge, Mass. Sep 1955. 42p diagrs, graph, table. Order from LC. Mi $3.30, ph $7.80. PB 118991

The design of antennas for radio astronomy is approached from two viewpoints: 1. The amplitude diffraction pattern $G(u,v)$ and the aperture amplitude illumination $F(x,v)$ are a pair of Fourier transforms. 2. The antenna is a transducer between object and image and as such acts as a bandpass filter for the spatial frequencies in the object. Certain problems in the use of multiple feeds for reflector type antennas are discussed. Report presented at the Symposium on Radio Astronomy of the National Electronics Conference, Chicago, 3, 4, 5 Oct 1955. AF CRC TR 55-119

Broadband dual-mode circular waveguide transducer, by R. D. Tompkins. U. S. Naval Research Laboratory. Nov 1955. 8p photos, drawings, graphs. Order from OTS. 50 cents. PB 111790

This paper describes a broadband dual-mode waveguide transducer designed to couple two orthogonal TE_{11} circular waveguide modes to separate rectangular waveguide ports. Developmental models are described to indicate the evolution from theory to the final model. Some problems encountered in attaining the small physical size are discussed in detail. The new junction has application to mode multiplexing, circular waveguide ferrite devices, circular polarization, and as a circular waveguide magic-T. NRL R 4660.

Circuit minimization: Sum to one process for irredundant sums, by Edward W. Samson and Rolf K. Mueller. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate, Communications Laboratory, Cambridge, Mass. Aug 1955. 21p. Order from LC. Mi $2.70, ph $4.80. PB 118992

The concepts of least sums and essential alternative sets have been developed in a broad sense and applied with other new theorems to develop powerful and rigorous algorithms. AF CRC TR 55-118.

Decay of a stellar magnetic field, by Bernard A. Lippmann. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research. Jun 1955. 14p table. Order from LC. Mi $2.40, ph $3.30. PB 119032

The decay of the solar magnetic field may be computed from a variational principle based on Lenz's law: i.e., since the fields resist any changes, they adjust themselves to make the decay time a maximum. A variational calculation of the decay time associated with one mode of the solar magnetic field has been made and compared with an exact value obtained by Wrubel. To the accuracy of the calculation, a simple, practical constant, trial function, plus one iteration, reproduces the exact result identically. NYU RR MH-3. AF CRC TN 55-676. Contract AF 19(604)-926.

Decay of magnetic fields, by Bernard A. Lippmann. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research. May 1955. 18p. Order from LC. Mi $2.40, ph $3.30. PB 119033

This report discusses the decay of a system of currents in a (bounded) region of finite conductivity, assuming that the decay is very slow. The chief results are a set of inter-related (vector) extremum principles for calculating the decay times associated with regions of arbitrary shape and conductivity. A vector iterational procedure, generalizing the standard procedure in scalar problems, is discussed, and it is pointed out that two-dimensional decay problems also may be treated by conformal mapping. NYU RR MH-2. AF CRC TN 55-677. Contract AF-19(604)-926.

Engineering study of radio interference suppression, by T. F. Knapp. Lear, Inc., Grand Rapids, Mich. Nov 1954. 63p photos, diagrs, graphs. Order from LC. Mi $3.90, ph $10.80. PB 119043

A quantitative study of conducted radio interference is presented showing the effect of some design factors and tolerances within a typical DC aircraft motor, and the effectiveness of various methods of suppressing the generated interference. Suppression methods are presented whereby the radio interference of a motor was suppressed below the limits of Specification MIL-I-6181A by using external filters, an integral filter within the motor structure and by using the field coils of the motor as the inductor element of the filter. Radio frequency measurements of the motor and components are also presented as a means of determining the resonant frequencies at which peak interference occurs and from which suppression components can be calculated. AF WADC TR 54-399.

Extension of the modified Wheeler network to nonreciprocal two-ports, by H. M. Altschuler and W. K. Kahn. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Jul 1955. 16p diagrs, table. Order from LC. Mi $2.40, ph $3.30. PB 119111

The extension of the (reciprocal) modified Wheeler network to include the more general non-reciprocal two-port is given. This representation is derived via a known decomposition of the general non-reciprocal network into two portions, one reciprocal, the other non-reciprocal. The representation obtained is constituted of eight independent elements, each of which is a natural idealization of a physical microwave component. Since six of these belong to the class of "bilaterally matched" networks the properties of this class are discussed. The measurement of the network parameters is also indicated. AF CRC TN 55-770. PIB-368. PIB R 436-55. Contract AF 19(604)-890.

Frequency characteristics of acousto-electrochemical effects: The elektrokinetic and polarized gas electrode effects, by Frank Saunders, Ernest Yeager, and Frank Hovorka. Western Reserve University. Dept. of Chemistry. Ultrasonic and Electrochemical Research Laboratory, Cleveland, Ohio. Sep 1953. 66f diagrs, graphs, tables. Order from LC. Mi $3.90, enl pr $12.30. PB 119052

Technical report no. 13 under Contract N7 onr-47002, Project no. 384-305.
1. Ultrasonics - Research 2. Electrodes, Hydrogen - Effect of supersonic waves 3. Waves, Supersonic - Thermodynamics 4. Sound, High frequency - Electrochemical effects.

Improvements in the type CA-1277 VOR monitor, by R. A. Forcier and C. G. Lynch. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Aug 1955. 22p photo, diagrs, graphs, tables. Order from OTS. 75 cents. PB 111827

This report presents the results of tests conducted to determine why the reference-channel phase-splitting stage in the Type CA-1277 VOR monitor is sensitive to tube changes and what corrective action is necessary to overcome this design deficiency. The effect of incorporating filters in the reference and the variable channels of the monitor on its calibration accuracy was also determined. It is shown that the modifications to the monitor decreased the over-all spread in the calibration-error curve from 4.2^{o} to 0.9^{o}, almost eliminated all effects caused by aging or exchanging of tubes, and reduced the effects of a-c hum on the monitor operation. CAA TDR 216.

Interaction of microwaves in gaseous discharge plasmas: Application to the fundamental processes in gases, by John M. Anderson and L. Goldstein. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Aug 1955. 169p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $7.80, ph $25.80. PB 119110

Interaction between microwaves simultaneously propagated through gaseous discharge plasmas, based upon a theory proposed for the similar phenomenon of radio wave interaction in the ionosphere - the "Luxembourg Effect," - is experimentally observed. The controllable laboratory microwave interaction is utilized for a study of certain fundamental processes in plasma and permits a determination of numerical parameters describing these processes. Technical report no. 7 under Contract AF 19(604)-524. AF CRC TN 55-777.

L-3028 magnetron. Litton Industries, Inc., San Carlos, Calif. Contract AF 33(038)-23064. Order separate parts described below from LC, giving PB number of each part ordered.

First quarterly report for period 6 Apr 1951-1 Jul 1951, by Norman H. Moore. Jul 1951. 5p. Mi $1.80, ph $1.80. PB 119056

Report no. 28-1.
1. L-3028 (Vacuum tube) 2. Vacuum tubes, Magnetron - Design.

Second quarterly report for period 1 Jul 1951-1 Oct 1951, by Norman H. Moore. Oct 1951. 13p fold drawing. Mi $2.40, ph $3.30
Report no. 28-2. PB 119057

Third quarterly report for period 1 Oct 1951-1 Jan 1952, by Norman H. Moore. Feb 1952. 11p fold drawing. Mi $2.40, ph $3.30.
Report no. 28-3. PB 119058

Fourth quarterly report for period 1 Jan 1952-1 Apr 1952, by Norman H. Moore. Apr 1952. 6p graph. Mi $1.80, ph $1.80. PB 119059
Report no. 28-4.

Fifth quarterly report for period 1 Apr 1952-1 Jul 1952, by Norman H. Moore. Jul 1952. 7p. Mi $1.80, ph $1.80. PB 119060

Report no. 28-5. For 6th report see PB 108310.

Seventh quarterly progress report for period 1 Oct 1952-1 Jan 1953, by Herman W. Smith, Jr. Feb 1953. 7f graphs. Mi $1.80, enl pr $3.30.
Quarterly report no. 28-7. PB 119055

Eighth quarterly progress report for period 1 Jan 1953-1 Apr 1953, by Herman W. Smith, Jr. Jun 1953. 15p drawings (1 fold), fold diagr. Mi $2.40, ph $3.30. PB 119061
Report no. 28-8.

Final engineering report, period 6 Apr 1951-30 Jun 1953. Vol. I, by H. W. Smith, Jr. Jun 1953. 36f drawings (part fold), diagr, graphs, tables. Mi $3, enl pr $7.80. PB 119054

This report presents final test data on the five tubes delivered under this contract, together with detailed factual data on the design problems met and their solutions. Report no. 28-9.

Final engineering report, period 6 Apr 1951-30 Jun 1953. Vol. II: Principal manufacturing data, by H. W. Smith, Jr. Jun 1953. 126p photos, drawings (part fold), graph. Mi $6.30, ph $19.80. PB 119062

This "Find manufacturing report" contains tentative specifications, outline, assembly, and piece part drawings, as well as fabrication procedures and flow charts which detail actual final tube construction. Report no. 28-10.

1-Kilowatt C. W. magnetron development. Progress report no. 10 for Mar 1, 1950-Jun 30, 1950 under Contract NObsr-39393, by A. L. Love. General Electric Co. Tube Division, Schenectady, N. Y. Nov 1950. 51f drawings. Order from LC. Mi $3.60, enl pr $10.80. PB 119050

1. Vacuum tubes, Magnetron - Design 2. Adhesives - Ceramic to metal 3. Contract NObsr-39393, Progress report no. 10.

Research for determining the time element in photoelectric emission. Quarterly progress report no. 7 for the period 1 May 1955 to 31 Jul 1955 under Contract AF 18(600)-1018, by G. L. Clark, D. F. Holshouser, H. M. Von Foerster. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Electron Tube Research Section, Urbana, Ill. Aug 1955. 5p. Order from LC. Mi $1.80, ph $1.80. PB 119120

Project No. R-115-032.
1. Electrons - Emission 2. Contract AF 18(600)-1018, Report no. 7.

Recording radar signals at intermediate frequencies, by John L. Ahearn, Jr., and J. M. Headrick. U. S. Naval Research Laboratory. Aug 1955. 16p photos, diagr, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 119143

A system has been designed and constructed that records both transmitted and received radar pulses at an intermediate frequency of 30 Mc over a bandwidth of 18 Mc. Pulse lengths from 1/4 μsec to 1 μsec are accommodated. In the recording process, each pulse echo is identified with the particular transmitted pulse that was its origin. NRL R 4611.

Research on hollow dense electron beams, by Lawrence A. Harris. Minnesota. University, Minneapolis, Minn. Sep 1955. 53p drawings, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 119118

Research on the problems of producing and focusing hollow dense electron beams is described. Some properties of magnetically shielded systems are derived and a new arrangement proposed. A design method for a toroidal electron gun to act as a beam source is outlined and discussed. The behavior of

hollow beams in radial electrostatic fields is summarized briefly and the applications noted. A method for the design and calculation of magnetic circuits applicable to these systems is presented and some modifications proposed. Finally there is a discussion of a possible magnetron type beam source and a beam viewer. Technical report HB2R. Project 47501. Contract AF 18(600)-1169. OSR TR 55-27.

Scattering of electromagnetic radiation by a cylindrical shell of finite length, by Calvin Hayden Wilcox. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Antenna Laboratory, Cambridge, Mass. Aug 1955. 196p. Order from LC. Mi $8.70, ph $30.30. PB 118990

In Part I various general results on electromagnetic scattering problems, which are needed in the subsequent work, are developed. In Part II the tensor Green's functions for Maxwell's equations and arbitrary regions of space are defined and the tensor Green's functions for the exterior and interior of an infinite cylinder, which are used in the formulation of the finite cylinder problem, are derived. Part III is devoted to the formulation of the integral equations governing the scattering problem for the finite cylinder and to a derivation of the connection between the radiation pattern of the scattered wave and the tangential electric field on $\mathcal{S}'$. In Part IV the thin cylinder approximation is discussed, the variational principle for the far field amplitude is derived, and the substitution of the trial function into the stabionary expression is carried out. Finally, in Part V, the approximation to the far field amplitude obtained in IV is subjected to analytical transformations which are designed to make it easier to compute by numerical methods and which are designed to make it easier to compute by numerical methods and which also make possible a determination of the asymptotic form of the far field amplitude for large values of L/λ. Several auxiliary results which are needed in the exposition are developed in the Appendixes. In particular the scattering problem for a thin semi-infinite cylinder is solved in Appendix 1. Thesis (Apr 1955) - Harvard University. Dept. of Mathematics. AF CRC TR 55-113.

Solid delay line developments for ground radar equipment, by Albert Feiner. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N. Y. Aug 1955. 19p photos, table. Order from LC. Mi $2.40, ph $3.30. PB 119001

Presented herein are the significant developments sponsored by Rome Air Development Center (RADC) in the field of solid delay lines for moving target indication (MTI). Also included are the advantages of solid delay lines over mercury delay lines, a discussion of the origin of spurious responses in a solid delay line and future plans for development in this field. AF RADC TR 55-5.

Theory of the supersonic delay line, by V. Hughes. Massachusetts Institute of Technology. Radiation Laboratory. Sep 1945. 69f diagrs, graphs, tables. Order from LC. Mi $3.90, enl pr $12.30. PB 119089

In Section I the equivalent circuit of the transmitter crystal is given. The effects on bandwidth, phase response, and loss of the type of media used on both sides of the crystal and of the type of circuit used for the source of voltage which is driving the crystal are discussed. Section II develops two theories of the wave pattern in the propagating medium, and applies these theories to the determination of the proper size of the receiver crystal, an estimation of the spreading of radiated energy, a computation of how the output voltage will vary as delay time is varied, and a computation of the loss in output voltage due to the wave pattern. Section III gives the equivalent circuit of the receiver crystal. Appendix I: Mason's derivation of the equivalent circuit of a thickness vibrating crystal. MIT Rad Lab 733. NDRC Div 14, SC-70. Contract OEMsr-262.

Generators, Motors, Transmission

Design and construction of low frequency multisignal correlator. Final engineering report under Contract no. AF 19(122)-213. D. G. C. Hare Co., New Canaan, Conn. Jan 1952. 64p. Order from LC. Mi $3.90, ph $10.80. PB 119181

Text only. Illustrations are bound separately. 1. Correlators, Electronic - Design 2. Recorders, Signal - Design 3. Contract AF 19(122)-213, Final report (Text).

Investigation of metallized paper capacitors. Addendum to final report under Contract no. DA-36-039-sc-215. Sprague Electric Co., North Adams, Mass. Aug 1953. 10p graph. Order from OTS. 25 cents. PB 111715s

Supplement to PB 111715. (See USGRR vol. 24, p. 178). Coordinates results in Final report (PB 111715) with those in Final engineering report on Contract W36-039-sc-36860 (PB 104114). Available with PB 111715 at $1.75 for both.

Miscellaneous

Experiments on the variation of conductivity of air within sealed rooms, by R. E. Holzer and A. E. Belon. California. University. Institute of Geophysics. Jun 1955. 27p photo, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 119218

This variation is attributed to a decrease in the condensation of nuclei. This is computed from conductivity according to Schweidler's theory of ion-equilibrium. The coagulation and sedimenta-

tion coefficients are found to depend strongly upon the degree of air turbulence. Scientific report no. 11 under Contract no. AF 19(122)-254. AF CRC TN 55-691.

Full-wave reversible-polarity half-cycle-response magnetic amplifiers, by C. B. House. U. S. Naval Research Laboratory. Jun 1955. 32p photos, diagrs, graphs. Order from OTS. $1. PB 111747

A full-wave magnetic-amplifier circuit which gives an output that is reversible in polarity or phase is presented in detail. Two different methods of control and a general comparison of their merits is included in the discussion. Expressions for efficiency versus installed capacity for representative amplifiers are also derived. Some considerations of the circuit as a suppressed-carrier modulator are presented with waveform shapes and fidelity characteristics. NRL R 4541.

Magnetic particle clutch and its application to servomechanisms, by W. P. Jones. U. S. Naval Research Laboratory. Nov 1955. 24p photos, drawings, diagrs, graphs, tables. Order from OTS. 75 cents. PB 111782

A study of various clutch configurations reveals that for minimum inertia the magnetic particle clutch should employ a coil which is located externally with respect to the remainder of the clutch. This external coil allows the output member to be made of a low-inertia thin-walled cylinder. The coil configuration may be of the salient pole or of the toroidal coil structure. Calculated data indicate that, for clutches with high torque-to-inertia and high dissipation-power-to-torque ratios, the salient pole structure is preferable to the toroidal coil structure when weight and space are important. In a unique application of clutches as the prime mover in a servomechanism, it was found that the magnetic particle clutch shows an advantage over a servo motor of comparable rating in regard to control power and response time. NRL R 4653.

Progress report no. XVI under Contracts no. N5 ori-07801 and DA-19-020-ORD-3429. Massachusetts Institute of Technology. Laboratory for Insulation Research. Dec 1954. 75p photo, drawings, diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 118878

For reports nos. VII-XV see PB 102421, 104335, 106079, 106886, 108282, 109929, 114956, 117412. 1. Spectroscopy, Dielectric 2. Crystallography, X-ray 3. Dielectric research 4. Ferromagnetism - Research 5. Magnetite - Properties 6. Barium titanate - Spectrographic analysis 7. Conductors, Semi - Ferromagnetic 8. Contract N5 ori-07801 9. Contract DA-19-020-ORD-3429.

FOOD AND KINDRED PRODUCTS

Influence of dietary fat on the glyceride structure of animal fat, by Raymond Reiser and Julius W. Dieckert. Texas. Agricultural Experiment Station. Dept. of Biochemistry and Nutrition, College Station, Tex. n.d. 15p tables. Order from LC. Mi $2.40, ph $3.30. PB 119156

In order to determine the glyceride structure of a representative mammal and bird, rats and chicks were raised on an essentially fat-free ration and the percentage of saturated triglycerides in their neutral fat determined by an isotope dilution procedure. In order to determine the influence of ingested fat, second groups were fed the fat extracted from the animals in the first group, at the 20% level. Third groups were fed cottonseed oil, which has "even" distribution of its fatty acid. Date is 1954 or 1955.

Synthesis of mucosa and lymph phospholipide during fat absorption, by Raymond Reiser and Julius W. Dieckert. Texas. Agricultural Experiment Station. Dept. of Biochemistry and Nutrition, College Station, Tex. n.d. 18p. Order from LC. Mi $2.40, ph $3.30. PB 119150

The present study is an effort to determine the relative activity of labeled glycerol and fatty acid in the triglycerides and phospholipides of the mucosa and lymph after the ingestion of triglycerides labeled in both moieties. The results of the study suggest some new concepts on the mechanism of fat absorption. Date is 1953 or later.

FUELS AND LUBRICANTS

Combustion researches and reviews, 1955. Invited papers presented at the 6th and 7th AGARD combustion panel meetings held respectively in Scheveningen, The Netherlands, May 1954 and in Paris, France, Nov 1954. Advisory Group for Aeronautical Research and Development. 1955. 200p photos, diagrs, graphs, tables (Text in English and French). Order from the Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. $5. PB 119167

Contents: Diffusion flames in the laboratory, by J. Barr. - Some problems pertinent to the combustion of sprays, by M. Gerstein. - Some aspects of combustion of liquid fuel, by C. C. Graves and M. Gerstein. - La formation et l'evolution des brouillards combustibles, by R. Kling. - Some notes on spray combustion, by J. R. Joyce. - Correlation of

combustion efficiency and injector characteristics under simulated altitude conditions. - Flame stabilization and flame propagation in ramjet combustors, by J. P. Longwell. - Etude des limites de stabilité en relation avec la résistance des obstacles à l'ecoulement, by A. Mestre. - Spontaneous ignition theory of combustion intensity and combustion stability behind a baffle, by B. P. Mullins. - Mechanism of carbon formation, by G. Porter. - Formation et dépot de carbone dans les foyers de turbomachines d'aviation, by C. Foure. - Similarity analysis for chemical reactors and the scaling of liquid fuel rocket engines, by S. S. Penner. - Rayonnement des flammes et similitude, by C. Codegone. - The role of wake transition in the process of flame stabilization on bluff bodies, by E. E. Zukoski and F. E. Marble.

Development of a rubber-compatible and ice-resistant lubricant for aircraft ordnance, by H. R. Baker, V. G. FitzSimmons, C. R. Singleterry, F. F. Sullivan, and T. M. Thomas. U. S. Naval Research Laboratory. Oct 1955. 41p drawing, graph, tables. Order from OTS. $1.25. PB 111739

The essential features of the GLT-700-60 formulation include (a) proper balance of selected esters and silicone oils to control rubber swell, (b) a 25 percent concentration of low volatile material in both the silicone and ester components to counteract drying out of the lubricant during high temperature exposure, (c) the inclusion of rust inhibiting and anti-wear additives which also resist emulsification and decrease ice adhesion, and (d) thickening with the minimum amount of lithium soap needed to assure lubricant retention in films of useful thickness, while maintaining a very low effective viscosity at -65°F. NRL R 4618.

Effects of aviation fuel components on the accuracy of the Karl Fischer electrometric titration method for determining the water content of fuels, by Robert W. Altman, Richard W. Sneed, and James C. Mosteller. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1952. 22p photo, tables. Order from LC. Mi $2.70, ph $4.80. PB 119106

A study was conducted to determine the effect of various concentrations of fuel components such as tetraethyl lead, aromatics, olefins, mercaptans and oxidation inhibitors on the accuracy of results obtained when determining water content of fuels by the Karl Fischer electrometric titration method. Of the compounds investigated, only mercaptans appear to give any appreciable interference in water determination by this method. AF TR 6387.

Foaming characteristics of recoil and hydraulic oils, by Harry C. Muffley. U. S. Arsenal, Rock Island, Ill. Apr 1955. 18p photos, tables. Order from OTS. 50 cents. PB 111727

The foaming characteristics of several recoil and hydraulic oils were determined and the effect of temperature, grease and water established in an effort to establish the validity of the observation of foam as a standard for the rejection of recoil mechanisms. The foaming characteristics of the recoil and hydraulic oils employed show a wide variation and are affected by many factors. The foamy appearance of the oil from a recoil mechanism is not a reliable standard upon which to declare a mechanism unserviceable. Dept. of the Army project 593-21-054. Ordnance project TB 5-5010B, Report no. 2. RIAL R 55-1686.

Hydraulic fluids, lubricants, fuels and related materials, by Edward M. Glass. Pennsylvania State College. Petroleum Refining Laboratory, State College, Pa. Jan 1949. 224p photos, diagrs, graphs, tables (part fold). Order from LC. Mi $9.90, ph $34.80. PB 119124

Twelve progress reports and nine problem reports were submitted by Pennsylvania State College, and the final report for the fiscal year 1948 is published here as an AF Technical Report. Data obtained during the fiscal year 1948 and under Contract Nord 7958(B). AF TR 5756.

Low-temperature lubricating engine oil additives, by Gilbert Gavlin, Edwin A. Swire, and Sam P. Jones, Jr. Armour Research Foundation, Chicago, Ill. Apr 1953. 368f photos, diagrs, graphs, tables. Order from LC. Mi $11.10, enl pr $58.85. PB 119093

The work reported was carried out to evaluate the limits of utility of commercial pour point depressants and viscosity index improvers with mineral oils, to determine the essential structural features of a pour point depressant, and to extend present knowledge of the mechanism of pour point depression. Review of the previously reported survey of 835 literature and patent references, as well as the evaluation of commercial additives is given. For other reports under this Contract see PB 108853 and PB 112118. Appendix A. Evaluation of commercial additives. Viscosity, viscosity index, and pour point data. - Appendix B. Experimental procedure. - Appendix C. Habits of pure n-paraffin wax crystallized from dewaxed Pennsylvania 150 neutral oil in the presence and absence of depressants. - Appendix D. Rheology of a lubricating oil at temperatures below the pour point (Manuscript of a paper presented before the Society of Rheology, Chicago, Oct 27, 1951). AF WADC TR 53-11. Contract AF 33(038)-1644, Final report.

Modified method for determining oxidation stability of aviation fuels, by R. W. Sneed, R. W. Altman, and J. C. Mosteller. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio.

Aug 1952. 34p diagrs, tables. Order from LC. Mi $3, ph $6.30. PB 119103

This test method appears particularly applicable to jet propulsion fuels forming large quantities of insoluble gum during oxidation. The major feature of the new procedure is the equipment modification which makes it possible to oxidize a sample and, without subsequent handling, determine the residue formed. The results obtained with a wide variety of aviation fuels indicate the modified method to be generally as suitable as the current methods, but superior for fuels forming insoluble residues during accelerated aging. AF TR 6390.

Organo-metallic and organo-metalloidal high-temperature lubricants and related materials, by Henry Gilman and Richard D. Gorsich. Iowa State College, Ames, Iowa. Apr 1955. 137p tables. Order from OTS. $3.50. PB 111889

An extension has been made of the preliminary screening of organo-metallic and organo-metalloidal compounds for thermal stabilities in connection with applications involving high-temperature lubricants and related materials. The studies now reported and in progress indicate some of the more promising radicals or groups that warrant incorporation in the organo-metallic and organo-metalloidal types. The effects of some of these groups are considered in the discussions which follow the experimental sections. In the experimental part there is included a table which outlines the preliminary screening of one hundred and thirty-seven compounds. Project no. 7340. Covers work performed during Sep 1953-Sep 1954. AF WADC TR 53-426, Part II. Contract AF 33(616)-94.

Report of rust preventive properties of aeronautical greases, by S. M. Collegeman. U. S. Naval Engineering Experiment Station, Annapolis, Md. n.d. 11p photos, tables. Order from LC. Mi $2.40, ph $3.30. PB 119122

The effectiveness of approved Army-Navy greases in preventing rusting in anti-friction bearings under very humid conditions has been investigated. Two methods, a static test and a bearing water washing test, were used to predict the rust-preventive properties of these greases. The results show that Specification AN-G-15 greases give less protection against rusting than the greases approved under Specifications AN-G-5a and AN-G-25. NAV EES C-3528.

HIGHWAYS AND BRIDGES

Load-transmission test for flexible paving and base courses. Part IV: Effect of base-course quality on load transmission through flexible pavements, by Raymond C. Herner. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Aug 1955. 15p photo, drawing, graphs. Order from OTS. 50 cents. PB 111828

Representative test data from the load-transmission project illustrate the relative effectiveness of typical base and subbase materials in protecting the subgrade from overstress. The relative effectiveness of a wide variety of materials can be predicted qualitatively by reference to triaxial tests, and there is hope that such correlation can be established on a quantitative basis. It is important that the triaxial loading rate and the condition of the specimens at the time of test be consistent with service conditions expected in the pavement. Presented at a meeting of the Highway Research Board in Washington, D. C. on Jan 13, 1955. Parts I-III are CAA Technical Development Reports no. 108, 144, 203. CAA TDR 269.

Soil and soil-aggregate stabilization. Symposium presented at the thirty-fourth annual meeting, Jan 11-14, 1955, Washington, D. C. Highway Research Board. 1955. 84p photos, maps, graphs, tables. Order from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D. C. $3. PB 119098

Contents: Science of soil stabilization, by Hans F. Winterkorn. - Inheritance factor in origin of clay minerals in soil, by Franklyn B. Van Houten. - Engineering pedology and soil stabilization, by F. L. D. Wooltorton. - Soil stabilization and colloid science, by Ernst A. Hauser. - Prediction of the consistency limits of soils and soil mixtures, by Manuel Pimentel Periera dos Santos. - Exchange adsorption by clays of large organic cations, by J. E. Gieseking. Discussion, by Ernst H. Goebel. - Microbiological factors in soil stabilization, by P. C. T. Jones. - Stabilization of laterite soils, by A. Remillon. - Soil stabilization with lime-flyash mixtures: Preliminary studies with silty and clayey soils, by T. Y. Chu, D. T. Davidson, W. L. Goecker, and Z. C. Moh. - Soil stabilization with resins and chemicals, by R. C. Mainfort. - Effect of calcium on the continuity of electroösmotic flow rate, by Ralph L. Rollins. - Elastic behavior of soil-cement mixtures, by Friedrich Reinhold. - Factors influencing physical properties of soil-cement mixtures, by Earl J. Felt. - Stabilization of Tennessee gravel and chert bases, by E. A. Whitehurst. Discussion, by Richard H. Miller. HRB Bul 108. NRC 359.

WASHO road test. Part II: Test data, analyses, and findings, by M. N. Carey, Jr. and A. C. Benkelman. Highway Research Board. 1955. 211p photos, drawings, diagrs, graphs, tables. Order from NAS-NRC Publications Office, 2101 Constitution Ave., N. W., Washington 25, D. C. $3.60. PB 119134

The WASHO test was conceived and sponsored by the Western Association of State Highway Officials.

It was a study of the behavior of certain flexible pavements under the repeated application of a number of selected heavy axle loads. For Part I see PB 114115. HRB SR 22. NRC 360.

INSTRUMENTS

A-C ionization detector, by David R. Whitehouse. Massachusetts Institute of Technology. Servomechanisms Laboratory. Jan 1955. 72p photos, drawings, diagrs, graphs. Order from LC. Mi $4.50, ph $12.30. PB 118989

This report describes a rugged and fast ionization chamber for the detection of neutron flux in a nuclear reactor. The theory is developed for a rather unique type of a-c chamber utilizing the acoustic pressure generated within the ionized gas by an applied a-c field. On the basis of this theory and preliminary experiments, a neutron-sensitive chamber was designed and constructed, then tested in neutron flux. The instrument proves to be rugged and fast, but its reliability is undetermined at this time. The experimental chamber has a minimum detectable flux level of 1.5×10^7 n/cm^2/sec, a dynamic range of 20 to 1 (2000 to 1 estimated as attainable), and a time response of 2 milliseconds. D.I.C. project no. 6986. Report based on a thesis - Massachusetts Institute of Technology. Contract N5ori-07876, NR-025-164, Technical report no. 4. MIT SL TR 4.

Arctic tests of meteorological equipment, by Walter A. VonWald, Jr. U. S. Naval Research Laboratory. Sep 1955. 22p photos, fold tables. Order from LC. Mi $2.70, ph $4.80 PB 119115

In order to find out how existing aerological equipment will act under arctic conditions, a cold-weather-instruments project was established in line with the Navy's interest in arctic operations. The investigation was carried out over a three-year period at Point Barrow, Alaska. Two classes of equipment were tested; one was standard Navy equipment, and the other was nonstandard commercial equipment. Four items of commercial equipment that were found to be of great value were the mercury-thallium thermometer, the resistance thermometer, the Alnor Dewpointer, and the radiation shield. NRL R 4606.

Automatic pipette washing machines, by Laurence R. Crisp and Harry Stierli. U. S. National Institutes of Health. Instrument Section, Bethesda, Md. Jul 1955. 12p photo, drawing. Order from OTS. 50 cents. PB 111745

1. Machines, Washing - Automatic - Design
2. Laboratory equipment - Decontamination.

Complex plane scanner, an analog computer, by George Kranc, Peter Mauzey, and John Wuorinen. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories. Aug 1955. 82p diagrs (part fold) graphs. Order from LC. Mi $4.80, ph $13.80. PB 118876

This report reviews the theory, indicates the applications, and describes certain specific circuits of a special type of electronic analog computer which uses sinusoidal voltages as analogs of phasors in the complex plane. The circuits which make up the heart of the computer, its central unit, are explained in detail. Project no. 47501. CU-8-55-AF-962-EE. CUN ERL TR T-2/F. OSR TN 55-261. Contract AF 18(600)-962.

Computing machine components program; seventh quarterly progress report for Jan-Mar 1954. U. S. Naval Ordnance Laboratory. Computer Components Division, Corona, Calif. Feb 1955. 61p diagrs, graphs. Order from LC. Mi $3.90, ph $10.80. PB 118716

Project order 27807. Contents: Magnetic film research. - Magnetic core applications. - Ten-megacycle pulse circuits. - Carry propagation and the parallel adder. - Design of beam deflection devices. NOL CR 151.

Development of instrumentation for determining the total chromaticity and chromaticity vs time of pyrotechnic items, by Gilbert H. Wetter. U. S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N. J. Apr 1955. 10p photo, diagrs. Order from LC. Mi $1.80, ph $1.80. PB 119139

The object of this research was to develop and utilize improved methods and instrumentation for determining the burning characteristics of flares, signals, and tracers. A portable instrument has been developed which gives a colormetric evaluation of the emission from pyrotechnic items, along with their burning times and average candlepower. Department of the Army project 504-01-027. Ordnance project TA 2-9201. PA TR 2161.

Electronic computer project. Monthly progress report no. 9 under Contract no. DA-36-034-ORD-1646, Proj no. TB3-0538, Sep 1955, by Herman H. Goldstine. Princeton University. Institute for Advanced Study. Sep 1955. 10p table. Order from LC. Mi $1.80, ph $1.80. PB 119072

1. Computers, Electronic 2. Contract DA 36-034-ord-1646.

Experimental investigation of factors involved in sonic listening, by R. C. Maninger. Columbia University. Division of War Research. Feb 1945.

39f graphs, tables. Order from LC. Mi $3, enl pr $7.80. PB 118987

P 33/R1319.
1. Sound, Underwater - Analysis 2. Sound, Underwater - Detection 3. Sound, Underwater - Measuring equipment 4. Hydrophones - Tests 5. Sonar - Listening devices 6. OSRD 6117 7. OSRD Div 6, SR-1128.

Evaluation of the condition of doped fabric surfaces by the Mullen burst strength test and other methods, by Elmer E. Jukkola. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Research Division. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Order separate parts described below from LC, giving PB number of each part ordered.

Supplement 1. Jul 1949. 24p photos, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 97711s

The Seyboth Penetrating Cone Fabric Tester and new models of the Mobile AMA Fabric Tester are evaluated in this supplement as instruments for determining the airworthiness of doped fabric surfaces on aircraft without cutting out sample for test. Determinations were made with each instrument on doped fabric test panels and strips from aircraft which had been subjected to weather exposure, and the data was compared with Mullen Burst Test values as previously reported. The instruments evaluate the condition of the fabric by penetrating thus producing an objectionable hole which must be patched to prevent further deterioration. However, with proper adjustment of the Mobile AMA Tester, the penetration of good fabric can be avoided and thus this method would be useful in finding extreme cases of deterioration. Supplement to PB 97711. AF TR 5700 Suppl. 1.

Supplement 2. Jul 1950. 12p drawings, tables. Mi $2.40, ph $3.30. PB 97711s2

A new model of the Mobile AMA Fabric Tester was submitted by Maintenance Division for evaluation as an instrument for determining the condition of doped fabric surfaces on aircraft in the field. The subject tester is a modification and improved version of Model D reported in Supplement 1. Comparative tests were made with this new instrument, the Mullen Tester, and breaking strength tests on weathered doped fabric test panels. The results indicate that this latest Mobile AMA Tester in the hands of an operator familiar with its limitations should be useful in the field for determining deterioration of fabric on doped fabric covered surfaces of aircraft. This instrument gives very little information concerning the condition of the dope. Supplement to PB 97711. AF TR 5700 Suppl. 2.

Final report on the time standard AN/FSM-5A, by Paul P. Bey and Harris F. Hastings. U. S. Naval Research Laboratory. Nov 1955. 47p photos, diagrs (1 fold), graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 118285

A study to determine the errors and deficiencies of the Navy broadcast time system has been made. New techniques providing marked improvement with reliable operation have been developed and embodied in time standards AN/FSM-5A and -5B. The measuring system employs a new preset counter technique and is capable of comparing the clock with radio time signals to better than 1 millisecond. The equipment was developed to provide secondary time standards at the various Naval Radio Stations which transmit radio time signals. NRL R 4639.

Gravity values obtained with the Gulf quartz pendulums over the North American gravity range, by John C. Rose and George P. Woolard. Woods Hole Oceanographic Institution, Woods Hole, Mass. Aug 1955. 91p maps, diagrs, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 118499

Continuation of Reference no. 53-36 (PB 112377) and revision of measurements reported in Reference 53-36 (PB 116842).
1. Gravity - Measurements 2. Pendulums 3. Gravimeters - Calibration 4. Gravity - Measuring instruments 5. Chronometers 6. WHOI REF 55-44 7. Contract AF 19(604)-585 8. Contract AF 19(122)-234.

High rate testing machine for measuring mechanical properties of solid propellants, by C. M. Minke, A. R. Shoff, and H. A. Winnerling. U. S. Alleghany Ballistics Laboratory, Cumberland, Md. Jul 1954. 30p photos, diagrs, graphs. Order from OTS. 75 cents. PB 111752

A testing machine has been designed and constructed at Allegany Ballistics Laboratory for the measurement of tensile and compressive properties of solid propellant compositions at high rates of deformation. The machine is capable of exerting loads up to 1000 pounds at piston speeds as high as 300 inches per minute, and accurate results are obtained in routine testing by non-technical operators. From these records values such as elastic modulus, tensile or compressive strengths and deformations can easily be computed. ABL B-11.

Instruction book: Vacuum tube testing equipment, model OCL. Weston Electrical Instrument Corp., Newark, N. J. Sep 1945. 46p photos, diagrs, tables. Order from LC. Mi $3.30, ph $7.80. PB 119094

1. Vacuum tubes - Testing equipment - Maintenance and repair 2. OCL (Vacuum tube testing equipment) 3. NAVSHIPS 900,807 4. Contract NXsr-59069.

Modern instruments for atmospheric-electric measurements. Part II, by R. E. Holzer and

S. Ruttenberg. California. University. Institute of Geophysics, Los Angeles, Calif. Jun 1955. 56p photos, diagrs, graph. Order from LC. Mi $3.60, ph $9.30. PB 119219

The instruments described in this report have been developed for the measurement of potential gradient, conductivity, air-earth current density and potential. Instruments were designed for battery operation for field locations where a.c. power was not available. Stability and accuracy were obtained with simple circuitry by careful consideration of battery drain and minimum amplification. Semi-automatic operation was achieved with the use of timing motors and cams, which increased the usefulness of the conductivity instruments and provided hourly zero checks on some instruments. Successful air-earth current instruments were developed, making use of long time constants in the input. Special high quality condensers, with very low leakage and dielectric absorption made this technique possible. Scientific report no. 9 under Contract no. AF 19(122)-254. For Part I see PB 111168. AF CRC TN 55-690.

Program of a two-dimensional scattering problem for an automatic-sequenced digital computer, by Glenn H. Keitel. Stanford University. Radio Propagation Laboratory, Stanford, Calif. Apr 1955. 103p diagr, tables. Order from LC. Mi $5.70, ph $16.80. PB 118993

Details of a numerical integration program are given for a high-speed digital computer, the National Bureau of Standards Western Automatic Computer (SWAC), at the University of California at Los Angeles. The logic of the program for the SWAC is described, including the purpose of all commands, the basic equations, the special features, flow diagrams, and coding sheets. The format of the results for this specific problem are shown. Scientific report no. 2 under Contract AF 19(604)-1031. AF CRC TN 55-356.

Programming manual for the NAREC, compiled by J. S. Seward. U. S. Naval Research Laboratory. Nov 1955. 82p photos, diagr, tables. Order from OTS. $2.25. PB 111784

In this report an attempt is made to compile in one place various materials needed by those who wish to program and code problems for solution on the NAREC (Naval Research Laboratory Electronic Digital Computer). A brief description of the computer is given followed by a detailed discussion of the binary number system which the machine uses. The orders which the computer executes automatically are presented along with simple examples of their use. Comments are made on such topics as problem solution, flow diagrams, and code-checking, and some of the basic computational subroutines are outlined in detail. NRL R 4652.

Turbulence measurements with the hot-wire anemometer, by Ralph D. Cooper and Marshall P. Tulin. Advisory Group for Aeronautical Research and Development. Aug 1955. 63p photo, diagrs, tables. Order free from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119096

The contemporary status of turbulence measurements utilizing the techniques of hot-wire anemometry is discussed. Certain essential definitions and ideas of the statistical theory of turbulence are reviewed. A list of significant experimental investigations, including a brief description of important features of the experiments, is presented in tabular form. The basic components of the anemometer and their functions, together with practical considerations and precautions relating to their selection, construction, and operation, are discussed. Progress in the measurement of turbulence in high speed flows is reviewed. Summary is also in French. AGARDograph 12.

MEDICAL RESEARCH AND PRACTICE

Antifungal antibiotics, by Frank L. Howard. Rhode Island. Agricultural Experiment Station. Aug 1954. 100p tables. Order from LC. Mi $5.40, ph $15.30. PB 119146

One hundred forty-three candidate antibiotics furnished by twenty-one agencies were tested for their fungicidal activity. Evaluation of antifungal action was obtained by four techniques: toxic agar in petri plates, spore germination inhibition on glass slides, impregnated cellulose pads on seeded agar, and retention of tensile strength of impregnated thread after exposure to molds. AF WADC TR 54-421.

Effect of selected visual training procedures on the visual form field, by J. M. Christensen and C. W. Crannell. Miami University, Oxford, Ohio. Apr 1955. 31p photo, graphs, tables. Order from OTS. $1. PB 111890

An experiment was performed to examine the possibility of increasing the area of the visual form field through certain training procedures. A comparison was made between training to read groups of digits exposed tachistoscopically and training to perceive single digits exposed to the periphery of the retina. It is concluded that perceptual training with extremely simple stimuli, such as those used in this investigation, is unlikely to result in a general improvement in form vision or in reading proficiency. These results contradict those found elsewhere in the literature. Project no. 7186. AF WADC TR 54-239.

Injury to animal ears by intense sound, by Donald H. Eldredge and Walter P. Covell. Washington University. School of Medicine, St. Louis, Mo. Aug 1952. 74p photos, drawings, diagrs, graphs

tables. Order from LC. Mi $4.50, ph $12.30. PB 119016

This report is a correlation of the data on exposure of animals to intense sounds with histologic findings for each cochlea. There are two sections to the report. The first part deals with the extent of damage and location of marked changes in the organ of Corti. The second part is concerned with a discussion of problems for further study suggested by the present findings. The material chiefly covers the higher frequency range of 4,000 cps up to 40,000 cps with intensities ranging from 115 to 165 db (ref. 0.0002 microbars). For Part 1 see PB 109032. AF TR 6531, Part 2.

Perception of direction as a function of binaural temporal and amplitude disparity, by R. J. Christman and George Victor. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N. Y. Sep 1955. 22p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 118998

This report describes an experiment which determined values of binaural delay and amplitude disparity required to produce an experience of sound direction or localization in an applied situation. Stimulus materials used were 10- sec pulses at a pulse repetition frequency (prf) of 240. Conditions were included in which the temporal delay and amplitude disparity both reinforce and act counter to each other. Combinations of delay and amplitude disparity which resulted in 90% and 75% directional judgments are presented in curve form. AF RADC TN 55-302.

Preparation of control specimens for the 1954 Aero Medical Field Laboratory balloon flights, by William J. Longmore. U. S. Air Force. Air Research and Development Command. Holloman Air Development Center, Holloman Air Force Base, New Mexico. May 1955. 15p photos, diagr, table. Order from LC. Mi $2.40, ph $3.30. PB 119131

A method is presented whereby biological specimens can be exposed to variations in environmental conditions similar to those encountered on high altitude balloon flights. These specimens, which are not exposed to cosmic radiation, can be utilized as controls for evaluating the effects of this radiation on specimens exposed on the high altitude balloon flights. AF HADC TN 55-6.

Psychiatric unit operational procedures. Revised edition. Northwestern University, Evanston, Ill. 1954. 167p diagr, tables. Order from LC. Mi $7.80, ph $25.80. PB 119039

Discusses the neuropsychiatric selection program of the Navy, mental hygiene, and psychiatric research as applied to the practical problem of military service. Includes an article "Abbreviated psychological measures" by Ivan N. Mensh and William A. Hunt. Contract N7onr-450-11, NR 154-091.

Records maintenance for a long-term monkey colony, by B. D. Fremming, R. E. Benson, R. J. Young, M. D. Harris, and D. S. Nachtwey. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1955. 8p tables. Order from LC. Mi $1.80, ph $1.80. PB 119141

A functional, comprehensive system of records maintenance is described in detail for use with monkeys as experimental animals in research. The system described has been in use for two years and employed successfully on 750 monkeys utilized in diverse research programs. AF SAM R 55-67.

Studies on the prevention of tooth decay, by James H. Shaw, Cra Ashley, and Aina M. Auskaps. Harvard University. School of Dental Medicine, Cambridge, Mass. Dec 1954. 3p. Order from LC. Mi $1.80, ph $1.80. PB 119147

Summary report. Technical report no. 3 for the period 1 Jan 1954-1 Dec 1954, under Contract N5 ori-07658, NR 180-026. See also PB 115825. 1. Teeth - Caries - Research 2. Dental research 3. Contract N5 ori-07658, NR 180-026, Technical report no. 3.

METALS AND METAL PRODUCTS

Absorption of solids in the soft X-ray region. Final report for period Sep 1, 1948 to Oct 31, 1954 under Contract no. N6onr-24109, NR 015-217, by M. Parker Givens. Rochester. University. Institute of Optics, Rochester, N. Y. Dec 1954. 38p drawings, diagrs, graphs. Order from LC. Mi $3, ph $6.30. PB 119085

The soft x-ray absorption of tellurium, vitreous selenium, metallic selenium, iron, and iron oxide has been studied in the region from 100A to 400A. Contract N6onr-24109, NR 015-217, Final report.

Binders in cemented refractory alloys, by J. T. Norton, J. Gurland, P. Rautala. Massachusetts Institute of Technology. Dept. of Metallurgy. Jun 1951. 156p photos, diagrs, graphs, tables. Order from LC. Mi $7.50, ph $24.30. PB 119136

A comparison of cobalt with other possible binder metals led to the conclusion that an effective binder must not lead to the presence of a third phase in the sintered products. On that basis, cobalt and nickel are suitable for use as binders for wolfram carbide, but not copper and iron. WAL R 671/99-18. Contract DA-19-020-ORD-10, Final report.

Crystal structure and twinning of Co_2S_3, by M. J. Buerger and Dean W. Robinson. Massachusetts Institute of Technology. Dec 1954. 13p tables. Order from LC. Mi $2.40, ph $3.30. PB 119046

A new analysis confirms the composition of the platy cobalt sulfide crystals made by von Fellenberg as Co_2S_3. The plates are usually hexagonal in outline and resemble pyrrhotite. The cell edges referred to hexagonal axes are a = 6.68, c = 16.35 Å. Technical report no. 4. MIT C L TR 4. Contract N5 ori-07860, Project NR 032-346.

Effects of stress concentration and triaxiality on the plastic flow of metals: Ductility of steels with different amounts of hydrogen, by Taiji Toh and W. M. Baldwin, Jr. Case Institute of Technology. Dept. of Metallurgical Engineering. Metals Research Laboratory, Cleveland, Ohio. Jan 1955. 23p drawing, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 119185

The ductility of an SAE 1020 steel cathodically charged to different hydrogen contents was determined as a function of strain rate and temperatures. Technical report no. 31. Contract N6 onr-273/I, NR 031-049.

Electrodeposition of titanium, part II, by Walter E. Reid, Jr., C. Agnes Gaudette, and Abner Brenner. U. S. National Bureau of Standards. Apr 1955. 12p tables. Order from OTS. 50 cents. PB 111876

The preparation of concentrated titanium-aluminum and zirconium-aluminum alloy baths by other means than use of the hard-to-obtain borohydrides of titanium and zirconium was investigated. This was done by reacting in an ether solution boron trichloride, lighium aluminum hydride, aluminum chloride, and titanium or zirconium tetrachloride. Under the experimental conditions used this method was not successful. An investigation was made of the possibility of using alcohols as complexing agents in solutions of titanium halides. No metallic deposits were obtained from this type of bath. Lithium borohydride (used to prepare titanium and zirconium borohydrides was prepared). Project no. 7312. AF WADC TR 54-485, Part 2. Contract AF 33(616)-53-11.

Fundamentals of the transition temperature phenomenon in steel. Twelfth progress report for the period 1 Jul 1954-30 Sep 1954 under Contract Nonr 266(07), by M. Gensamer, J. O. Brittain, H. Hahn and F. Deronja. Columbia University. School of Mines. Dec 1954. 9p graph, table. Order from LC. Mi $1.80, ph $1.80. PB 119047

Efforts to produce a relatively coarse grain size in a 1020 steel and in a rimmed 1010 steel are discussed. Data are presented for two series of iron specimens which were tested after heat treating in a hydrogen atmosphere and in an argon atmosphere. The solid state outgassing of a series of specimens which were fabricated from vacuum melted ingots is reported. The status of the internal friction apparatus is mentioned. For reports 9-11 see PB 116097, PB 116880 and PB 117792.

Grain-boundary behavior in creep of aluminum bicrystals, by F. N. Rhines, W. E. Bond, and M. A. Kissel. U. S. National Advisory Committee for Aeronautics. Dec 1955. 56p photos, diagrs, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119125

The gliding of one metal crystal with respect to another parallel to their mutual grain boundary has been studied in pure aluminum bicrystals during isothermal creep at temperatures ranging from 200° to 650° C under static stresses of 10 to 1,600 psi. The mechanism of grain-boundary gliding is described as a coordinated alternation of slip and recovery in a chain of subgrains along the creep boundary. This concept is employed to account both for the rate of primary creep and for the transition from primary to steady-state creep. NACA TN 3556.

Handbook on titanium, part 2, by Heinrich K. Adenstedt. Avco Manufacturing Corporation. Lycoming Division, Stratford, Conn. Sep 1955. 161p photos, drawings, diagrs, graphs, tables. Order from OTS. $4.25. PB 111873

Information has been collected on specific properties of titanium and procedures for the treatment and utilization of titanium and its alloys by literature survey and by personal contact with the proper persons and institutions. The data have been evaluated and are condensed in this report. The two major sections of titanium technology covered are: laboratory procedures and fabrication. Project no. 7351. Covers work from Mar 1954 to Mar 1955. For Part 1 see PB 111631. AF WADC TR 54-305, Part II. Contract AF 33(616)-2222.

High temperature project. Final report under Contract N9 onr-87301, by Joseph B. Conway and Aristid V. Grosse (with a section by W. L. Doyle). Temple University. Research Institute, Philadelphia, Pa. Jul 1954. 69f photos, drawings, diagrs, graphs, tables. Order from LC. Mi $3.90, enl pr $12.30. PB 119063

The "High temperature project" was concerned with the development of new methods for the production and maintenance of extremely high temperatures in special furnaces, utilizing chemical reactions. This report summarizes work carried out from June 1, 1949 to July 1, 1954. Contains Oxy-germanium torch and flame, by W. L. Doyle.

Hot cracking of stainless steel weldments, by P. P. Puzak, W. R. Apblett, and W. S. Pellini. U. S.

Naval Research Laboratory. Aug 1955. 19p photos, diagrs, graphs, tables. Order from *LC*. Mi $2.40, ph $3.30. PB 119010

Various heats and forgings of type 347 and type 304 stainless steels were investigated with the aim of establishing the mechanism of weld- and base-metal hot cracking. It is deduced that hot cracking of the base metal results from the liquation of fusible segregates located at the boundaries of grains which adjoin the fusion line of the weld proper. Final report. NRL R 4597.

Intermediate temperature creep and rupture behavior of titanium and titanium-base alloys, by Jeremy V. Gluck and James W. Freeman. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Sep 1954. 114p photos, graphs, tables. Order from *LC*. Mi $6, ph $18.30. PB 119041

The object of the investigation was to determine the relationship between typical structural conditions of representative titanium-base alloys and their mechanical properties in the range from 600° to 1000°F. In order to accomplish this purpose, tensile, short time rupture, and creep properties were determined. The materials studied were: commercially pure titanium, Ti 75A; a commercial alpha-beta alloy, Ti 150A; an experimental stable alpha alloy, 6% Al - 94% Ti; and an experimental stable beta alloy, 30% Mo - 70% Ti. In addition, hardness, x-ray, and metallographic studies were made. AF WADC TR 54-112.

Luminescent efficiency of large crystals of $CaWO_4$ and $CdWO_4$, by Paul W. Levy. Carnegie Institute of Technology. Dept. of Physics, Pittsburgh, Pa. Jun 1952. 92p diagrs, graphs, tables. Order from *LC*. Mi $5.40, ph $15.30. PB 118394

A method applicable to large single crystals has been developed and applied to crystals of synthetic $CaWO_4$ and $CdWO_4$. As an adjunct to the efficiency measurements the luminescent spectra of these materials was measured at liquid N_2, dry ice, and room temperatures. Also, their reflection of 2537 A ultraviolet and optical transmission from 2100 A to 8000 A is given for room temperature. Final report, period Jan 1, 1951 to Jun 30, 1952. Contract Nonr-230(00), NR 015-314, Final report.

Magnesium alloy research studies, by A. Jones, J. H. Lennon, R. R. Nash, W. H Chang, E. G. McPeek. Rensselaer Polytechnic Institute, Troy, N. Y. Sep 1952. 140p photos, diagrs, graphs, tables. Order from OTS. $3.50. PB 111762

Diagrams are presented to show the constitution at 500° and 700°F for the magnesium-lithium-aluminum and magnesium-lithium-zinc alloy systems. These diagrams were determined mainly by microscopic examination of alloys quenched from elevated temperatures. Single crystals of high purity magnesium were grown by controlled solidification in a gradient furnace. The furnace and the mold remained stationary and only the temperature gradient moved. Causes and remedies are discussed for the failure to produce magnesium alloy single crystals. AF WADC TR 52-169. Contract W 33-038-ac-22542.

Measurement of the melting point of strontium titanate, $Sr\ Ti\ O_3$, by Erwin K. Weise and A. S. Chodakowski. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Aug 1955. 9p diagrs. Order from *LC*. Mi $1.80, ph $1.80. PB 119119

Technical note 3 under Contract AF 33-038-12644. OSR Project 52-670A-85.
1. Strontium titanate - Thermal properties 2. ILU EES TN 3 3. OSR TN 8-55-294 4. Contract AF 33-038-12644, Technical note 3.

Methods for improving soundness of gunmetal bronze castings, by W. H. Johnson, H. F. Bishop and W. S. Pellini. U. S. Naval Research Laboratory. Jul 1955. 16p photos, drawings, diagrs, graphs. Order from *LC*. Mi $2.40, ph $3.30 PB 119011

Two methods for improving soundness of gunmetal bronze castings are discussed and compared: (1) vacuum treatment of melts and (2) wedge chilling of castings. NRL R 4578.

Optical and photoconductive properties of silicon and germanium, by E. Burstein, G. S. Picus, and N. Sclar. U. S. Naval Research Laboratory. Jul 1955. 46p graphs, tables. Order from OTS. $1.25. PB 111748

This review of the electrical and optical properties of silicon and germanium is divided into a discussion of (a) those properties whichare intrinsic to the elemental semiconductor and (b) those which are due to impurities in the lattice. The addition of impurities in these semiconductors is shown to have an important effect on the electrical and optical properties of such materials. Correlations between the energy levels set up ty impurities and their distribution coefficients and diffusion constants are indicated. The optical absorption, photoresponse, and impact ionization of these centers are presented in terms of hydrogen model, and deviations from this model are noted. A simple treatment for impurity photoconductivity is given, and magnitude of response is calculated for various conditions of doping, background radiation, and competitive absorption. The time constant for the photoresponse is computed for optical, phonon, and electron impact recombination mechanisms and comparison is made with existing data. Finally, practical considerations relating to the effective use of such photoconductors are included. NRL R 4501.

RIA alkaline derusting operations, by A. C. Hanson. U. S. Arsenal, Rock Island, Ill. Jun 1955. 12p. Order from OTS. 50 cents. PB 111744

Operation of an alkaline de-rusting bath used at Rock Island Arsenal for cleaning steel, brass or magnesium and for stripping phosphate deposits and paint is described. Methods are also given for disposal of cyanide wastes from this process in order to avoid stream pollution. RIA L R 55-2462.

Saturation concentration of calcium hydroxide, by Rune Hedin. Svenska Forskningsinstitutet för Cement och Betong, Stockholm. 1955. 15p graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 119005

The Chemical Department of the Swedish Cement and Concrete Research Institute, Stockholm, has made systematic tests in which the solubility of chemically pure $Ca(OH)_2$ varying in particle size was measured at different temperatures, and has deduced formulae for calculating the solubility within the limits of the most common variations. Svenska Forskningsinstitutet för Cement och Betong, Stockholm. Handlingar 27.

Solid state properties and catalytic activity. Fourteenth periodic status report for period Oct 1, 1954-Dec 30, 1954 under Contract no. N6 onr-27018, NR 051-265, by Hugh Taylor. Princeton University. Dept. of Chemistry. Dec 1954. 7p. Order from LC. Mi $1.80, ph $1.80. PB 119034

A summary of progress and a list of publications on the effects of crystal structure imperfections and impurities on the catalytic properties of oxide and alloy systems.

Some observations of elastic properties of solids under explosive loading, by J. Dewey, H. I. Breidenbach, Jr., and J. W. Gehring, Jr. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Aug 1955. 29p photos, diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119091

The strains and shock fronts in a magnesium alloy subjected to a contact detonation have been determined from flash radiographs. From these the stresses and stress-strain ratios for the compressional and shearing strains at the shock fronts have been computed, using finite strain theory. Much less complete observations on plate glass and Catalin 61-893 are reported and reduced. Dept. of the Army project no. TB 03-04-002. ORD project no. TB 3-0112. APG BRL R 931.

Theoretical and experimental investigations of the atomic phenomena occurring on and near the surfaces of solids. Technical report no. 3: Use of field emission microscope for the investigation of surface conditions on an alloy of molybdenum and zirconium, by L. Arthur D'Asaro. Cornell University. Dept. of Physics, Ithaca, N. Y. Sep 1955. 155p photos, (part color) drawing, graphs, tables. Order from LC. Mi $7.50, ph $24.30. PB 119135

This investigation was initiated with the object of finding out to what extent the field emission microscope could be utilized to give information concerning the distribution of the components of an alloy on its surface. The alloy used in these experiments was molybdenum containing a small amount of zirconium. Variations in current density of field emitted electrons from various positions on the surface can be used to find the location of materials of differing work function. Project no. R-355-30-4. Color in photographs will not reproduce. OSR TR 55-23. Contract AF 18(600)-674.

Thermal and related physical properties of molten materials. Part II: High temperature reactions of sodium hydroxide, by Dale D. Williams and R. R. Miller. U. S. Naval Research Laboratory. Feb 1955. 65p photos, diagrs, graphs, tables. Order from OTS. $1.75. PB 111883

A study has been made of reactions between several container metals and liquid sodium hydroxide. Nickel was investigated most completely but some results are given on gold, iron, chromium, copper, and stainless steel. Most studies were made between 700° and 900°C, however, the temperature range extended from the melting point to 1050°C for the gold-hydroxide reactions. MPR no. 33(616)-54-102, Project no. 1252. AF WADC TR 54-185, Part II.

Titanium alloys for elevated temperature application, by W. F. Carew, F. A. Crossley, D. J. McPherson. Armour Research Foundation, Chicago, Ill. Contract AF 33(038)-22806. ARF Project 7351, Task Order 73510. Order separate parts described below from LC, giving PB number of each part ordered.

Part I. Jun 1955. 323p photos, tables. Mi $11.10, ph $49.85. PB 119008

Results on the following phases of the investigation are presented: (1) effect of carbon, nitrogen and oxygen on the tensile, impact and creep-rupture properties of Ti-6% Al alloy; (2) tensile test evaluation of experimental alloys including binary alloys of β stabilizing additions to titanium; (3) effect of vacuum annealing on tensile ductility of alloys containing 8% or more of aluminum; (4) creep-rupture evaluation of alloys; (5) creep evaluation of alloys; (6) evaluation of stability of room temperature tensile properties upon exposure to creep at elevated temperatures; and (7) evaluation of the rolling and welding characteristics of the alloys: 6% Al-0.5% Si, 6% Al-4% V and

7% Al-3% Mo. Technical report for the period Jun 1953 to May 1954. AF WADC TR 54-278, Part I.

Part II. Jul 1955. 112p photos, graphs, tables. Mi $6, ph $18.30. PB 119009

This report summarizes the work of the fourth contract period in the investigation of the effects of various practical alloying elements on the elevated temperature properties of titanium-base alloys, and of problems related to the application of titanium-base alloys. Technical report for the period Jun 1954 to Dec 1954. AF WADC TR 54-278, Part II.

WADC magnesium symposium held on 24 February 1953, edited by Henry A. Johnson. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1953. 73p photos, diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 119044

Contents: Sec. I. Opening remarks, by Stanley C. Stewart. - Sec. II. Introduction to magnesium, by Art W. Winston. - Sec. III. Department of Defense policy towards use of magnesium, by Timothy May. - Sec. IV. Current aircraft wrought magnesium applications and reasons for selecting magnesium, by C. N. Mortenson. - Sec. V. Protective finishes and service experience for magnesium, by James S. Kirkpatrick. - Sec. VI. Fabrication of magnesium, by C. R. Kemp. - Sec. VII. Design criteria and cost comparisons, by D. A. Beck. - Sec. VIII. Closing remarks, by M. E. Sorte. - Conclusion. AF WADC TR 53-405.

METEOROLOGY AND CLIMATOLOGY

Absorption spectrum of the atmosphere from 4400 to 5500A, by J. A. Curcio, L. F. Drummeter, and T. H. Cosden. U. S. Naval Research Laboratory. Dec 1955. 7p graphs, tables. Order from OTS. 50 cents. PB 111860

Spectra recorded over a 17.5-mile horizontal path with 40 centimeters of precipitable water in the path show three absorption bands at 4425-4465A, 5017-5111A, and 5398-5478A. Wavelengths of the lines in the bands have been measured and are presented to the nearest 0.1A. Microphotometer traces of the bands are presented. NRL R 4669.

Bibliography on snow, ice and permafrost with abstracts. Vol. VIII. U. S. Library of Congress. Technical Information Division. Jul 1955. 286p. Order from LC. Mi $11.10, ph $43.85. PB 119002

Dept. of the Army project no. 8-66-02-004. For volumes 1-7 see PB 113539-113540, 112250, 112252, 114461, 115969, and 117329.

1. Snow - Bibliography 2. Ice - Bibliography 3. Permafrost - Bibliography 4. SIPRE 12, vol. 8.

Evaluation of the Eastern Air Lines prognostic - chart method. Part II: Movement of cyclones, anticyclones and fronts. U. S. Air Force. Air Weather Service, Andrews Air Force Base, Washington, D. C. Oct 1955. 10p tables. Order from LC. Mi $1.80, ph $1.80. PB 119015

For Pt. I see PB 118814.
1. Cyclones - Forecasting - Methods 2. Anticyclones - Forecasting - Methods 3. Weather forecasting - Methods 4. AF AWS TR 105-138/2.

Hypothesis for the origin of solar flares, by Walter Orr Roberts and Donald E. Billings. Harvard University. High Altitude Observatory, Boulder, Colo. Mar 1955. 5p. Order from LC. Mi $1.80, ph $1.80. PB 119183

1. Solar flares - Origin - Theory 2. Contract AF 19(604)-969, Scientific report no. 2 3. AF CRC TN 55-495.

Infrared transmission of blackbody radiation through the atmosphere, by Darrel Burch and John Nelson Howard. Ohio State University Research Foundation, Columbus, Ohio. May 1955. 56p graph, tables. Order from LC. Mi $3.60, ph $9.30. PB 119108

In this report the formulas developed previously are applied to the calculation of the percent transmission of radiation through the atmosphere in the spectral region 0.7 to 17.5μ. The calculations are made for blackbody sources at temperatures of 3000°, 5000°, 7000°, and 9000°K, and for total pressures of 125, 500, and 760 mm Hg as a function of water-vapor density in the air. In the spectral region 0.7 to 1.22μ, empirical formulas developed by Elder and Strong are used for water-vapor concentrations greater than 1.0 precipitable centimeter. OSURF Proj 535, Scientific rept. no. 2. AF CRC TN 55-857. Contract AF 19(604)-516.

Ionosphere propagation research. Technical report no. 2-2 under Contract AF 19(604)-712, for the period Oct 1-May 31, 1954, by L. C. Edwards. Raytheon Manufacturing Company, Waltham, Mass. Jun 1955. 134p diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 119132

Under Item No. 4 of the contract, "The Study of the COZI Technique During Nighttime Hours," two methods of evaluation were pursued. One method involved the collection of backscatter data on 3.310 and 6.425 megacycles on a routine basis during the nighttime hours. The other method consisted of conducting communication tests with aircraft on cross-country missions during the nighttime hours. Eight flights were conducted during the period of

November 1954 through June 1955 and the results of these tests indicated that the COZI technique for maintaining optimum communications was equally as valuable during the night as during the day. The object of the polarization studies was to determine the relative amplitudes of the horizontally and vertically polarized components of ionospherically propagated radio waves. For reports no. 1-2 part 1 see PB 113979, PB 115740, PB 116992. Appendix: Long range meteoric echoes via F-layer reflections, condensation of a paper by J. T. de Bettencourt and W. A. Whitcraft, Jr., presented at the joint URSI-IRE meeting, 4 May 1954, at Washington, D. C. AF CRC TR 55-168.

Mountain wave--jet stream project. Final report under Contract no. AF 19(604)-1308, by Harold Klieforth. California. University. Dept. of Meteorology, Los Angeles, Calif. Aug 1955. 43p photos, tables. Order from LC. Mi $3.30, ph $7.80. PB 119031

The present project evolved as a logical sequel to the 1951-1952 Sierra Wave Project and the brief Mountain Wave field season in 1954. The activities of these studies have been presented in the Final Report of the Sierra Wave Project published in July 1954 (PB 115570). The general purpose of the new project was to obtain further information on the nature of the jet stream, particularly over mountainous terrain, and on the relationship of the mountain wave to the jet stream or "jetlets." The specific purpose of the project was to "calibrate" the B-29 and B-47 aircraft of Project Jet Stream for the measurement of vertical motion in the atmosphere. Continues work of Sierra Wave Project. (For final report on this project see PB 115570).

Periodic fluctuations of the Eurasian high and the oceanic low pressure areas, by E. Gherzi. St. Louis. University. Institute of Technology, St. Louis, Mo. Oct 1955. 21p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119021

An analysis of a 3 year series of the historical weather maps (1946-1947; Jan-Jun 1934; Jul-Dec 1952) seems to show a continuous and almost parallel oscillation of the borders of the oceanic (Pacific and Atlantic) lows. Secondary waves of a period of 3 days are prevalent. The atmospheric high ridges connecting the polar and subtropical highs have a prevailing duration of 3 days. The maps for 10 winters (Dec., Jan., Feb. 1930-37, 1946-47) were considered. Scientific report no. 1 under Contract AF 19(604)-1294. AF CRC TN 55-486.

Scattering and absorption of infrared radiation in the atmosphere, by Dudley Williams. Ohio State University Research Foundation, Columbus, Ohio. May 1955. 9p. Order from LC. Mi $1.80, ph $1.80. PB 119113

This report summarizes the results obtained in theoretical and experimental studies of attenuation of infrared radiation by scattering and absorption. Resumes of the scientific reports already issued are presented in the present report along with a discussion of various studies that were not carried to definitive conclusions. The work described includes theoretical studies of absorption and scattering of infrared radiation and experimental infrared studies of scattering by particles of known size, scattering and reflection by clouds, and absorption by atmospheric gases under controlled laboratory conditions. AF CRC TR 55-286. OSURF Proj 535 Final report. Contract AF 19(604)-516, Final report.

Studies of the universal aspect of atmospheric electricity. Final report for period 1951-1955 under Contract no. AF 19(122)-254, by R. E. Holzer. California. University. Institute of Geophysics. Jun 1955. 84p graphs. Order from LC. Mi $4.80, ph $13.80. PB 119024

A program of measurement of the atmospheric electrical potential gradient, conductivity, and air-earth current density was undertaken in order to determine the relative magnitude and time dependence of world-wide changes in the earth's electric field. Continued measurement of such universal changes in the earth's electrical system is essential in obtaining conclusive evidence concerning the cause of the earth's electric field and is expected to be of value in meteorological studies of world atmospheric circulation. For quarterly reports no. 2-3 see PB 113425-113426. AF CRC TR 55-279.

Upper atmosphere research report no. XXIV: Aerobee-Hi report number 1: The RTV-N-10b firing, by E. C. Pressly, C. P. Smith, and J. W. Townsend, Jr. U.S. Naval Research Laboratory. Sep 1955. 37p photos, drawing, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 119145

Aerobee RTV-N-10b was launched at the White Sands Proving Ground at 1115 MST on 5 October 1954. This rocket, originally a standard RTV-A-la Aerobee furnished to the Navy by the Air Force, was modified and instrumented as a special test vehicle to obtain propulsion, structural, and aerodynamic data for use in the design and development of the Aerobee-Hi rocket. The principal modifications made by the Aerojet-General Corporation to the original Aerobee were an increase in the propellant tank volumes and a change in the mixture ratio to improve the specific impulse of the rocket. Included in addition to the primary instrumentation were an extra aspect camera loaded with color film, a parachute installation to recover the nose instrumentation, Pirani pressure gages, and a test installation of a pyrotechnic propellant-shutoff valve with its associated combustion pressure switch. Telemetered data were received throughout the flight and they have been reduced with good results from all of the instrumentation. NRL R 4576.

Weather information from B-47 flights. U. S. Air Force. Air Weather Service, Andrews Air Force Base, Washington, D. C. Oct 1955. 39p map, diagrs, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 119006

This report is based on studies made by AWS Project Black Sheep. The B-47 weather instrumentation, kinds of weather observations, their accuracy and value, and procedures for recording and transmitting are briefly discussed. Fuller details of some of these matters are given in appendices. AF AWS TR 105-127.

MINERALS AND MINERAL PRODUCTS

Crystal chemistry of silicates. Final report under Contract N6 ori-20, Task order XXI, NR 081-014, by Julian R. Goldsmith. Chicago. University, Chicago, Ill. 1954. 3p. Order from LC. Mi $1.80, ph $1.80. PB 118538

Lists 26 technical reports under this contract which have been published in various periodicals. The principal aim was to clarify the crystal chemistry of a number of rock-forming silicates, particularly the feldspars. Contract N6 ori-20, T. O. 21, NR 081-014.

Mechanical-property tests on ceramic bodies. Third annual report for the period 21 Feb 1952 to 21 Feb 1953, under Contract AF 33(038)-8682, by O. K. Salmassy, W. H. Duckworth, and A. D. Schwope. Battelle Memorial Institute, Columbus, Ohio. Mar 1953. 157f photos, drawings, diagrs, graphs, tables. Order from LC. Mi $7.50, enl pr $25.80. PB 119092

The aim of this investigation is to furnish a clear understanding of the fracture of ceramic bodies, and, if possible, to determine quantitative definitions of the resistance to fracture in terms of external variables. Effects of size and stress state were given primary consideration. Effects of strain rate and temperature were also considered. Most of the research was conducted on Plaster of Paris Specimens of porcelain and of nickel-bonded titanium carbide were also tested. Effect of superposed bending stresses on tension-test data was analyzed using Weibull's theory. Analysis of the standard compression test indicated that fracture data from this type of test were unreliable. For 1st-2d annual reports see PB 108095 and PB 111416. Appendix I. Preparation of data. - Appendix II. Statistical treatment of data. - Appendix III. Weibull's statistical theory of strength. - Appendix IV. Basic test data from combined-stress tests. AF WADC TR 53-50.

Method for determination of specific surfaces applied to coarse grained powders, by Gösta Ringquist. Svenska Forskningsinstitutet för Cement och Betong, Stockholm. 1955. 28p diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119004

By measuring the work done during the withdrawal of liquid from the capillaries in a bed of powdered material saturated with liquid, the external specific surface of the material under test can be determined with an accuracy which is higher than that corresponding to an error of 10 per cent in a range extending from 25 $cm^2.g^{-1}$ to 3 000 $cm^2.g^{-1}$. The equipment required for the tests made by means of the method advanced in this paper is extremely simple and easy to handle. The results of measurements are independent of the particle shape, the particle size distribution, and the density of the material to be tested. The results of measurements are evaluated by the aid of a simple, empirical formula containing two constants, which are dependent on the liquid used in the tests and on the test temperature. Svenska Forskningsinstitutet för Cement och Betong, Stockholm. Handlingar 28.

Prestressed ceramic structures, by F. R. Shanley, W. J. Knapp, and R. A. Needham. California. University. Dept. of Engineering, Los Angeles, Calif. Jan 1955. 105p photos, diagrs, graphs, tables. Order from OTS. $2.75. PB 111944

The objectives of the project are reviewed; methods of attaining these objectives are discussed; a summary of the testing program is presented. Details of various phases of the project are covered in appendices. The overall results indicate that eventual development of an efficient structure which will withstand high temperatures appears possible through the use of prestressed ceramic structures, but that further research and experimental work must be done before such construction can be incorporated into actual aircraft missiles. Recommendations for future programs are included. Project no. 1368. Final report, summarizing work done from 1 Nov 1953 through 31 Dec 1954. AF WADC TR 54-75, Part II. Contract AF 18(600)-120.

ORDNANCE AND ACCESSORIES

Ordnance inspection handbook: Procedures and tables for continuous sampling by attributes. U. S. Ordnance Corps. Aug 1954. 88p graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 119099

Includes amendments of Sep 1955.
1. Sampling, Industrial 2. Ordnance - Inspection 3. ORD M 608-11.

Some characteristics of craters from high speed pellets impacting into semi-infinite targets, by M. E. Van Valkenburg, W. G. Clay, F. W. Longson, and W. Mayeda. Utah. University.

Dept. of Electrical Engineering, Salt Lake City, Utah. Sep 1955. 15p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119087

The penetration, crater volume and crater area resulting from the impact of pellets of various shapes with speeds in the range of 1 to 4 mm/μsec are tabulated in this report. Materials used in the experiments include aluminum, magnesium, steel, brass, zinc, lead, plastic pellets, and wax targets. The method of producing ultra-speed pellets is described as well as the method of measuring velocity, crater volume, crater area, and penetration. Technical report no. 2 under Contract AF 18(600)-1217. OSR Project no. 409-040. OSR TR 55-287.

PERSONNEL APTITUDE TESTING

Investigation and test of the trouble-shooting ability of aviation electricians, by Arthur I. Siegel, John J. Jensen and Elliott R. Danzig. Institute for Research in Human Relations, Philadelphia, Pa. Jan 1955. 89p photos, diagr, tables. Order from LC. Mi $4.80, ph $13.80. PB 118996

Series 1955, Institute report no. 1.
1. Personnel, Electronics - Ability tests 2. Electricians - Performance - Tests 3. Contract Nonr-1348(00).

Validation of the U. S. Medical Research Laboratory personnel assessments. Technical report no. 1: Submarine personnel selection, by Robert R. Mackie, Forrest K. Strayer, and Donald N. Buckner. Management and Marketing Research Corp., Los Angeles, Calif. Dec 1954. 75p tables. Order from LC. Mi $4.50, ph $12.30. PB 119040

This report describes an investigation of the validity of the U. S. Medical Research Laboratory Personnel Assessments for class standing at the time of graduation from the Submarine School, New London, and for subsequent performance aboard submarines as measured by shipboard ratings and the time taken to become a qualified submariner. The development and reliability of the rating scale criterion, as well as the relationships between Submarine School Class Standing, Navy Basic Battery aptitude test scores, "Time to Qualify" and the shipboard ratings, are discussed. NAVMED Proj 002-013. Contract Nonr 1113(00), NR 151-141.

PHYSICS

General

Dirac bracket transformations in phase space, by Peter G. Bergmann and Irwin Goldberg. Syracuse University. Institute of Industrial Research. Dept. of Physics, Syracuse, N. Y. Dec 1954. 28p. Order from LC. Mi $2.70, ph $4.80. PB 119083

The purpose of this paper is twofold. One is to analyze the group-theoretical significance of the Dirac bracket and to examine, in particular, the apparent ambiguities in the presence of both first-class and second-class constraints. The other is to prepare the ground for the utilization of the Dirac bracket for the quantization of generally covariant theories. OSR TR 10. Contract N6 onr-24806, NR-010-201, Technical report no. 10.

Effect of stretching of a vortex core, by John R. Weske. Maryland. University. Institute for Fluid Dynamics and Applied Mathematics, College Park, Md. Aug 1955. 22p photos, drawings, diagrs. Order from LC. Mi $2.70, ph $4.80. PB 119076

Computations are presented of the effect of stretching of a vortex core on the assumption that viscosity is inoperative while stretching occurs. The results show that as the stretching exceeds a certain value backflow occurs in the core and the resulting flow in an annular region close to the center of the core becomes radially unstable. Experimental evidence is presented which shows that backflow actually occurs. These results are appraised in regard to their possible significance for those cases of turbulent flow and of transition from laminar to turbulent flow in which discrete vortices are present and subjected to stretching. Technical note BN-57. OSR TN 55-282. Contract AF 18(600)-893, Project NR 352-20-80.

Formulas for the elastic constants of plates with integral waffle-like stiffening, by Norris F. Dow, Charles Libove, and Ralph E. Hubka. U. S. National Advisory Committee for Aeronautics. 1954. 26p drawings, diagrs, graphs. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 119012

The constants, which include the effectiveness of the ribs for resisting deformations other than bending and stretching in their longitudinal directions, are defined in terms of four coefficients, and methods for the evaluation of these coefficients are discussed. Four of the more important elastic constants are predicted by these formulas and are compared with test results. NACA 1195.

Improved optimum free volume theory of liquids, II, by John S. Dahler and Joseph O. Hirschfelder. Wisconsin. University. Naval Research Laboratory. Dept. of Chemistry, Madison, Wis. Jan 1955. 10p. Order from LC. Mi $1.80, ph $1.80. PB 119186

This is a preliminary report outlining the use of a new type of averaging of pair potentials over angles

in order to spherically symmetrize the free volume cage. This new average potential establishes a degree of correlation between the notions of neighboring molecules and seems to give a better approximation to the partition functions. It also has the advantage of not leading to divergent integrals. For Part I see PB 117989. WIS-ONR-15.

Mathematical analysis of some atmospheric dynamics and statistical prediction of surface pressure by linear and quadratic functions of pressure sequences at grid points, by G. P. Wadsworth. Massachusetts Institute of Technology. Division of Industrial Cooperation. Sep 1955. 111p diagrs, tables. Order from LC. Mi $6, ph $18.30. PB 119029

Scientific report no. 1 for the period 1 May 1954 to 30 Jun 1955 under Contract AF 19(604)-991. Contents: Part A. Mathematical analysis of some atmospheric dynamics, by Prescott D. Crout. - Part B. Statistical prediction of surface pressure by linear and quadratic functions of pressure sequences at grid points, by George P. Wadsworth and Joseph G. Bryan.

Neutral constituent molecular diffusion in the high atmosphere: Calcium distribution, by Phillip W. Mange. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Aug 1955. 53p graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 119026

The immediate purpose of this report is to examine more fully the behavior of calcium in an attempt to verify the earlier predictions of Nicolet with regard to the rapidity of diffusive redistribution of calcium (and of meteor atoms in general). Another important purpose is the presentation of the mathematical methods whereby the diffusive transport and ultimate redistribution of any minor constituent in the high (nonisothermal) atmosphere may be predicted as a function of time in the presence of any source or sink which for the purposes of discussion is considered to be a function of the altitude and time. PSC IRL SR 77. AF CRC TN 55-498. Contract AF 19-(604)-1304.

On a certain class of stochastic approximation processes, by Donald Burkholder. North Carolina State College. Institute of Statistics, Raleigh, N. C. May 1955. 88p. Order from LC. Mi $4.80, ph $13.80. PB 119121

A class of stochastic approximation processes which contain the class of Robbins-Monro processes used in the estimation of a root of a regression equation, the class of Kiefer-Wolfowitz processes used in the estimation of the maximum of a regression function and related classes of stochastic approximation processes is defined and studied. Theorems on convergence with probability one and on asymptotic normality of the elements of this general class are proved. Institute of Statistics mimeograph series no. 129. OSR TN 55-168. Contract AF(600)-458.

Plasma state of gases, by R. Rompe and M. Steenbeck, translated from the German by G. C. Akerlof. Jan 1950. 174f diagr, graphs, tables. Order from LC. Mi $8.10, enl pr $28.50. PB 119053

Koppers Co., Inc., Industrial fellowship no. 243-X. Translated under Contract N9 onr-83301, Project NR 223-064, with the Mellon Institute of Industrial Research from Ergebnisse der exakten naturwissenschaften, v. 18, 1939.
1. Plasma, Electron - Germany 2. Gases, Ionized - Conductivity - Theory - Germany 3. Gases, Ionized - Electrical properties - Germany.

Simplified method of solving linear and nonlinear systems, by Rubin Boxer and Samuel Thaler. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N. Y. Aug 1955. 35p graphs, table. Order from LC. Mi $3, ph $6.30. PB 118999

A simplified method is described for obtaining the response of linear and nonlinear systems, without knowledge of the roots of the system characteristic equation. The solutions are given as time series representing the values of the response at equally spaced instants of time. Initial conditions are introduced easily through the use of the Laplace transform. The results are compared with the exact solutions obtained by analytic means. The same methods are then extended to the solution of time-varying, nonlinear, and time-lag systems. An example of each type is worked out in detail to illustrate the wide applicability of the technique. A discussion of error considerations is included. AF RADC TR 55-44.

Statistical discrimination in populations, by Bruce M. Bailey and N. Grier Parke. Parke Mathematical Laboratories, Inc., Concord, Mass. Apr 1955. 10p graph. Order from LC. Mi $2.40, ph $3.30. PB 119022

Scientific report no. 1 under Contract AF 19(604)-1396.
1. Statistical methods 2. Probability - Theory 3. Mathematics - Statistical theory 4. AF CRC TN 55-195.

Stochastic methods in quantum mechanics, by Gilbert W. King. Arthur D. Little, Inc., Cambridge, Mass. Feb 1950. 24p. Order from LC. Mi $2.70, ph $4.80. PB 118904

If one averages over a time of appropriate length, the lowest stationary state can be found by repeated application of the Hamiltonian on an arbitrary state. The question discussed in this paper is whether or not this equation is susceptible to attack by the random-walk algorithm. Technical report no. 4 under Contract no. N6-onr-228, T. O. II, Project NR 033-243.

Studies in eigenvalue problems. Kansas. University. Dept. of Mathematics, Lawrence, Kansas. Contract Nonr 58304. Order separate parts described below from LC, giving PB number of each part ordered.

Technical report 10 (revised technical report 7): Functional spaces and functional completion, by N. Aronszajn and K. T. Smith. 1954. 71p. Mi $4.50, ph $12.30. PB 119077

1. Harmonic functions 2. Mathematical equations and solutions 3. Approximate computations.

Technical report 12: Variational approximation methods applied to eigenvalues of a clamped rectangular plate. Part 1: Auxiliary problems, by N. Aronszajn and W. F. Donoghue. 1954. 76p tables. Mi $4.50, ph $12.30. PB 119078

1. Plates, Flat - Vibration - Theory 2. Plates, Flat - Buckling 3. Plates, Flat - Stress analysis.

Technical report 13: Generalization of an inequality of Hardy-Littlewood and applications, by Kennan T. Smith. 1954. 18p. Mi $2.40, ph $3.30. PB 119079

1. Harmonic functions 2. Equations, Integral 3. Hardy-Littlewood equations.

Tables of definite integrals involving Bessel functions of the first kind, by Terence Butler and Karl Pohlhausen. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1954. 55p tables. Order from LC. Mi $3.60, ph $9.30. PB 119104

An analytical study and numerical evaluation of the definite integrals of products of Bessel functions of the zero and first order of the first kind and with the arguments being products of the integration variable and the roots of the Bessel function of zero order. The report also includes the results for the case when the integrand contains a power of the integration variable as an additional factor. The integrations are always performed with the integration limits zero and one. Project no. 3058, Task no. 70423. AF WADC TR 54-420.

Three decision continuous sampling plan for attributes, by I. Richard Savage. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Jan 1955. 37p graphs. Order from LC. Mi $3, ph $6.30. PB 118995

1. Sampling (Statistics) 2. Mathematical equations and solutions 3. SU AMSL TR 20 4. Contract N6 onr-25126, NR 042-002, Technical report 20.

Turbulent heat-transfer measurements at a Mach number of 0.87, by Maurice J. Brevoort and Bernard Rashis. U. S. National Advisory Committee for Aeronautics. Dec 1955. 13p drawing, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119126

An axially symmetric annular nozzle was used to obtain essentially flat-plate data on turbulent-heat-transfer coefficients and temperature-recovery factors for a Mach number of 0.87 and for a Reynolds number range from 9.88×10^6 to 2.09×10^8. The heat-transfer coefficients are slightly higher than theoretical results for a Mach number of 1.0, and they agree with theoretical results for incompressible flow. The temperature-recovery factors decreased from 0.899 at a Reynolds number of 9.88×10^6 to 0.876 at a Reynolds number of 2.09×10^8. NACA TN 3599.

Unpublished statistical tables, by D. Teichroew. California. University. Dept. of Mathematics. Numerical Analysis Research, Los Angeles, Calif. Dec 1954. 9p. Order from LC. Mi $1.80, ph $1.80. PB 119038

This note lists tables computed at Numerical Analysis Research, University of California, Los Angeles. The list contains tables connected with probability and statistics which have been computed at NAR. Some of these tables were computed as an end in themselves; others were by-products in computations or were computed because the machine codes were available from other problems. Technical report under Contracts Nonr-233(24), Project NR-044-144, Contract DA 04-495-Ord-559, Project TB 2-0001 (1210); and Contract AF 18 (600)-931.

Viscous flows near side edges and leading edges, by Leon Trilling. Massachusetts Institute of Technology. Fluid Dynamics Research Group. Jun 1955. 70p. Order from LC. Mi $3.90, ph $10.80. PB 119123

This paper gives the solution of the Navier Stokes equations for the unsteady motion of a viscous incompressible fluid past a parabolic cylinder parallel to its generatrices and of the linearized Oseen equations for the steady flow past a quarter infinite thin flat plate whose edges are respectively parallel and perpendicular to the direction of undisturbed motion. Report no. 4. OSR TN 55-220. Contract AF 18(600)-1306.

Nuclear

Cosmic rays. Final report for period Jun 18, 1946-Dec 31, 1954 under Contract N6ori-111, Task Order II, NR-021-007, by Robert B. Brode and William B. Fretter. California. University. Dept. of Physics, Berkeley, Calif. Dec 1954. 10p. Order from LC. Mi $1.80, ph $1.80. PB 119028

This project has supported a study of the cosmic radiation with particular emphasis on precise measurements of the properties of mu mesons and heavy unstable particles produced in penetrating showers. Final report lists theses, technical reports, and manuscripts submitted to the Office of Naval Research.

Dissociative recombination, by Ernest Bauer and Ta-You Wu. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research. Oct 1955. 27p graphs. Order from LC. Mi $2.70, ph $4.80. PB 119109

Exemplifies studies by using hydrogen molecular ions capturing a free electron and splitting into two hydrogen atoms. This is a theoretical study. AF CRC TN 55-865. NYU RR CX-21. Contract AF 19(122)-463.

Electric resonance in a dipolar gas, by F. E. Geiger and J. I. Kaplan. U. S. Naval Research Laboratory. Dec 1955. 9p. Order from OTS. 50 cents. PB 111778

This problem is analogous to the Purcell-Bloch nuclear magnetic resonance absorption of a system of nuclear spins. Expressions are obtained for the complex electric susceptibilities, assuming strong collisions between dipoles. These expressions are similar to Bloch's phenomenological equations for the magnetic susceptibilities. NRL R 4648

Field ion emission, by Erwin D. Müller and Kanwar Bahadur. Pennsylvania State University. Dept. of Physics. Field Emission Laboratory, University Park, Pa. Sep 1955. 52p photos, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 119020

Field desorption of barium, thorium, oxygen and some other adsorbates is studied in a field emission microscope with reversed polarity as a function of field strength, temperature and degree of coverage. The mechanism of field emission of positive ions is considered as depending upon the supply of molecules and their ionization probability in a field up to 500 million volts/cm. The possibility of operating a field desorption microscope with sufficient resolution to show the lattice structure of the surface is discussed. Contents: Part I. Field desorption, by Erwin W. Müller. - Part II. Field ionization of gases at a metal surface and the resolution of the field ion, microscope, by Erwin M. Müller and Kanwar Bahadur. CSR TN 55-307. Contract AF 18(600)-673.

Final report for period May 1947-Dec 1954 under Contract ONR n7 291-05. National Research Council. Committee on Nuclear Science. Dec 1954. 15p. Order from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D. C. PB 119027

Report on work of Committee and its subcommittees. Includes: List of preliminary reports and the Nuclear Science Series reports issued by the Committee, and membership list for the period through May 1955.

Light elements in cosmic rays: Double-scintillation-counter experiment, by Leland S. Bohl. Minnesota. University. Dept. of Physics, Minneapolis, Minn. Dec 1954. 47p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 119084

The present experiment uses a counter technique instead of nuclear emulsions. The self-recording apparatus was mounted in a gondola and flown on high altitude balloons. The purpose of the experiment is to resolve the charge spectrum of the primary cosmic rays, and to determine how the flux of the light elements compares with that of the carbon, nitrogen and oxygen group. Technical report under Contract N6onr-246: Cosmic ray project, Thesis - University of Minnesota.

Monte Carlo reactor calculation, by S. Podgor and L. A. Beach. U. S. Naval Research Laboratory. Dec 1955. 10p graphs. Order from OTS. 50 cents. PB 111865

The Monte Carlo method has been used to estimate the slowing down of fast neutrons in a spherical homogeneous mixture of U^{235} and H_2O. The estimated probability distribution of thermalization was compared favorably with those of other calculational methods and with experimental measurements. These probability distributions were used to calculate the critical ratio of U^{235} to H_2O for both bare and reflected core reactors. NRL R 4673.

Photonuclear yields of N^{17}, by Daryl D. Reagen. Stanford University. W. W. Hansen Laboratories of Physics. High-Energy Physics Laboratory, Stanford, Calif. Feb 1955. 55p photo, drawings, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 119019

Yield curves of N^{17} arising from electron and x-ray bombardment have been measured for the elements oxygen, fluorine, neon, sodium, magnesium, and aluminum. Nitrogen-17 was identified by its delayed neutrons which made the measurement of low yields feasible. For the more complex reactions, the photon cross sections are very broad in their energy dependence, and increase in the region of 150-350 Mev. The total photonuclear cross section above 150 Mev estimated from the results reported here is of the same order of magnitude as the photomeson cross sections previously reported. Thesis - Stanford University. SU HEPL 35. Contract N6 onr-25116, NR 022-026.

Proceedings of the Conference on Effects of Radiation on Dielectric Materials, Naval Research Laboratory, Washington, D. C., Dec 14-15, 1954, under the joint sponsorship of Naval Research Laboratory and Office of Scientific Research, Air Research and Development Command. Nov 1955. 168p photos, diagrs, graphs, tables. Order from OTS. $4.25. PB 111863

ONR symposium report ACR-2. Contents: Basic concepts of radiation chemistry applicable to effects of radiation on dielectrics, by M. Burton. - Survey of the chemistry of polymer formation, by S. B. Crecelius. - Polymer synthesis by gamma radiation, by T. D. Callinan. - Survey of radiation effects, by R. Smoluchowski. - Changes of electrical conductivity of alkali halides upon irradiation with high-energy protons and gamma rays, by E. Pearlstein and H. Ingham. - Energy dependence of radiation effects, by E. Pearlstein and H. Ingham. - Research on radiation effects in insulating materials at Brookhaven National Laboratory, by P. W. Levy and G. J. Dienes. - Some effects of radiation on alkali halides, alkali nitrates, and diamond, by C. J. Delbecq, P. Pringsheim, and P. Yuster. - Studies of the effects of radiation on dielectric materials at North American Aviation, Inc., by R. L. Carter. - Radiation effects on glass, by N. J. Kreidl. - An account of some investigations of radiation damage produced by energetic pile neutrons in some valence and ionic crystals, by W. Primak. - Effect of neutron irradiation on dielectric materials: A report of some studies at ORNL, by D. S. Billington and J. H. Crawford, Jr. - Pile bombardment effects in some refractory crystals, by M. C. Wittels and F. A. Sherrill. - Radiation stability of polymers, by O. Sisman and C. D. Bopp. - Conductivity of polyethylene and teflon during irradiation at low temperatures, by R. A. Meyer. - Effects of pile neutron irradiation on the structure of lithium fluoride, by W. J. Sturm. - Effects of atomic radiation on high polymers, by K. H. Sun. - Determination of the effects of radiation fields on dielectric materials, by G. W. Pomeroy. - Atomic radiation and polymers, by L. A. Wall. - Analytical evaluation of the effects of radiation on organic materials, by J. Saldick. - Radiation effects on dielectric materials, by C. Mannal.

Pulse-amplitude analysis in nuclear research, by Albert B. Van Rennes. Massachusetts Institute of Technology. Servomechanisms Laboratory. Jan 1955. 153p photos, diagrs, graphs, table. Order from LC. Mi $7.50, ph $24.30. PB 118988

This investigation examines the pulse-height analysis problem to determine specifications on stability of window width and window level in a multi-channel analyzer and to determine the effects of the statistical nature of the input data. It includes a detailed survey of equipments for measurement of pulse-amplitude spectra, including techniques involving data storage. A unified method is presented for evaluating analyzer performance through recognition that all analyzers consist of level selectors preceded by circuitry or equipment equivalent to a biased preamplifier. With this method, a system has been designed and constructed for recording pulse-amplitude data on 35-mm film and later reducing these data photoelectrically. Accuracy limitations imposed by statistical effects and cathode-ray spot size have been studied. Typical amplitude spectra obtained with this equipment are presented. DIC Project no. 6986. Includes article with same title reprinted from Nucleonics, July-Oct 1952. MIT SL TR 3. Contract N5ori-07876, NR-025-164.

Self-energy effects on meson-nucleon scattering according to the Tamm-Dancoff method, by William M. Visscher. Maryland. University. Physics Department, College Park, Md. n.d. 19p diagr. Order from LC. Mi $2.40, ph $3.30. PB 119035

Calculations of the meson-nucleon scattering phase shifts have recently been performed by the Tamm-Dancoff method. This paper is essentially a continuation of one in which that undertaking is reported. The lowest-order Tamm-Dancoff equations were there derived and solved approximately by numerical methods, with several of the terms in the kernel simply dropped. It is the purpose of the present paper to ascertain the effects of the former omission on the scattering phase shifts. Date is 1953 or later. Technical report no. 7 under Contract Nonr 594(00). Part of thesis - Cornell University.

PHYSIOLOGY

Prediction of human tolerance for heat in aircraft: A design guide, by W. V. Blockley, J. W. McCutchan, and Craig L. Taylor. California. University. Dept. of Engineering, Los Angeles, Calif. May 1954. 161p graphs, tables. Order from LC. Mi $7.80, ph $25.80. PB 119018

Included are the means to evaluate the net thermal effect of the diverse physical factors comprising the thermal environment of man, so that all combinations of these quantities may be compared on a common scale of reference. Graphical aids to computation are provided, permitting rapid calculation for standardized or typical conditions. The final expression of thermal effect is in terms of a time duration, arrived at by means of a general body parameter rate of heat storage. Predictive estimates are provided both for safe tolerable duration of stress and for duration of unimpaired psychomotor performance as a function of body heat storage rate; both design limits are based on the minimum times which have been observed in experiments on normal healthy young men. A series of appendices is provided, which outlines the theoretical considerations and experimental data upon which the charts and procedures for tolerance prediction are based. AF WADC TR 53-346. Contract AF 33(616)-32.

PSYCHOLOGY

Coding by groups as a mode of stimulus presentation, by W. B. Knowles and E. P. Newlin. U. S. Naval Research Laboratory. Sep 1955. 12p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119144

Using a 5 x 5 matrix of lights and a similar panel of pushbuttons, five subjects were required to respond to sequences of 60 signals presented in subsequences of two, three, or four signals with intervals of 0.37, 0.52, 0.68, or 1.02 sec between signals. Performance on each of these 12 experimental conditions was compared with a signal-by-signal control condition in terms of speed and accuracy measures. It was found that under limited conditions coding by groups can result in better performance than the item-by-item mode of operation, and that the amount of information rather than the rate at which it is presented seems more critical in determining the temporal organization of the responses to grouped signals. NRL R 4604.

Influence of specific stimulus cuing on location responses, by Eugene R. Long and William A. Lee. Virginia. University, Charlottsville, Va. Dec 1953. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119017

The present experiment sought to learn whether and under what conditions stimulus location would be benefitted by providing the observer with setting cues relative to the shape or contour of the critical stimulus figure to be detected, without any spatial location cuing. The obtained results indicate that figural contour cuing alone can increase the accuracy of stimulus location, but only under very limited conditions, specifically, (1) only when the setting information is given before stimulus presentation, (2) when both stimulus and confusion figures are undistorted, and (3) when the degree of response restriction produced by the setting cues is very specific, possibly limited to a single figure. Third of a series of reports on "Set" as a determiner of perceptual responses under Contract W 33(038)-ac-21269. AF WADC TR 53-314.

Methods for studying work and emotionality in group operation, by Herbert A. Thelen, Dorothy Stock, and others. Chicago. University. Human Dynamics Laboratory. 1954. 216f diagrs, tables. Order from LC. Mi $9.60, enl pr $34.80. PB 118986

1. Group behavior 2. Psychological research 3. Reactions (Psychology) 4. Contract Nonr 660(00), NR 170-176.

Objective definition of simple structure in linear factor analysis, by Ledyard R. Tucker. Princeton University. Dept. of Psychology and Educational Testing Service, Inc., Princeton, N. J. Nov 1954. 36p diagrs, tables. Order from LC. Mi $3, ph $6.30. PB 119080

The principle of simple structure, proposed by Thurstone as a solution to the problem of indeterminacy of position of axes in the factorial structure, has received wide support and use in factor analysis. It is the purpose of this paper to assist in solving the problem of subjectivity by attempting to develop a more objective and operational view of the simple structure concept. Contract N6 onr-270-20, Project NR 150-088.

Psychological considerations in the design of training equipment, by Robert B. Miller. American Institute for Research, Pittsburgh, Pa. Dec 1954. 147p diagrs, graphs, tables. Order from OTS. $3.75. PB 111880

This report is essentially a digest of previously published material. It has been adapted for persons who may not have a professional background in psychology. The report is intended for those who participate in framing the requirements for training devices, designing them and, in lesser degree, for those who use them in training. Project no. 7197. Digest of PB 117701-117702, 110763 and 111879. AF WADC TR 54-563. Contract AF 33(616)-2080.

Structural energetics of learning, a study of the effect of personality-trend and collective structures on reading rate improvement, by Floyd H. Allport, Everett W. Reimer, and John A. Valentine. Syracuse University. Maxwell Graduate School of Citizenship and Public Affairs. Washington Research Office. Jul 1954. 71f graphs, tables. Order from LC. Mi $4.50, enl pr $13.80. PB 119064

1. Learning - Theory 2. Reading - Rate 3. Psychological research 4. Contract N6 onr-248(07).

RUBBER AND RUBBER PRODUCTS

Development and test of diaphragms from synthetic rubber materials, by Newton J. Lumm. Bendix Aviation Corporation. Bendix Products Division, South Bend, Ind. Aug 1953. 74f photos, diagrs, graphs, tables. Order from LC. Mi $4.50, enl pr $12.30. PB 119090

This is a report on the development and test of low temperature and ozone resistant convoluted type diaphragms for use in fuel metering devices. The diaphragms are evaluated individually for specific items of performance. Evaluations are also made using the diaphragms combined in a fuel metering device for metering at low temperatures. Service testing is covered on a quantity of controls using the diaphragms assembled by production methods. AF WADC TR 53-320. Contract AF 33(616)-40.

Development of a rubber for high temperature service in contact with experimental hydraulic fluids, by Frederick G. Kitts. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Aug 1954. 20p tables. Order from OTS. 50 cents. PB 111766

The proposed operation of hydraulic systems at temperatures in excess of 500°F made necessary the development of a rubber for packings, gaskets, hose, etc., which would withstand newly developed fluids at system temperatures; the use of standard packings was proven to be impracticable. Various commercial and experimental polymers were evaluated at elevated temperatures and ethyl acrylate copolymers were found to have the best inherent resistance to the fluids at high temperatures. Compounding studies were made on two such copolymers with particular emphasis on curing systems and fillers. A compound was developed which laboratory tests indicate is satisfactory. AF WADC TR 54-318.

Development of ozone and/or oxygen resistant polymers. Technical report no. 20, Jan 31 to Feb 28, 1954, under Contract no. DA-20-089-ORD-36531, by R. G. Spain. Burke Research Co., Van Dyke, Mich. Mar 1954. 14p tables. Order from OTS. 50 cents. PB 111722s

This report covers test data obtained in February for new polymers and polymer modifications on the project for development of tire stocks with improved ozone resistance. Data on physical tests, accelerated aging and ozone resistance are given for polymer modifications described in previous reports. Supplement to PB 111722 (Pages may be inserted).

Four articles on butadiene polymerization, by Glenn H. Miller and Carl F. Perizzolo. California. University, Los Angeles, Calif. Feb 1954. 43p diagr, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 119142

Contents: Styrene popcorn polymer and the effect of various sulfur containing compounds on its growth. - Effect of various free radical initiators on butadiene polymerization. - Attempts to produce popcorn copolymers. - Miscellaneous investigations. Contract AF 33(616)-290. AF WADC TR 54-58.

Process development of fluorinated unsaturated hydrocarbons, by W. H. Seaton and A. Syverson. Ohio State University Research Foundation, Columbus, Ohio. Mar 1955. 18p. Order from LC. Mi $2.40, ph $3.30. PB 119117

This project was originated to produce fluorocarbon monomers for the Quartermaster Corp's Arctic rubber program. This report includes the preparation of sixteen halogenated propenes, butenes, and butadienes. Final report under Contract DA 44-109qm-425 for the period Apr 1951 to Dec 1954. OSURF Proj 451, Report 59 (Final).

STRUCTURAL ENGINEERING

Determination of residual stresses by indentation methods, by Robert A. Bareiss. Lessells and Associates, Inc. Dec 1954. 46p photos, diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 119045

Experimental and mathematical analyses of three promising methods of measuring residual stresses are described. Particular emphasis is placed upon the heavy indentation technique and it is shcwn how this test can be used to determine the direction and magnitude of uniaxial residual surface stresses. The light indentation technique is also discussed, including a brief study of the possibility of using ultrasonic surface waves as a means of detecting the initiation of plastic flow in the indentation. A mathematical analysis of the drilling out technique is presented directed towards a better understanding of the mechanisms of stress relief using this method. AF WADC TR 54-615. Contract AF 33 (616)-253. Project no. 7351.

Tests of prestressed concrete beams, by R. A. Breckenridge and S. L. Bugg. U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, Calif. May 1955. 83p photos, (fold) diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 119007

This report covers the fabrication, prestressing, grouting, and testing to destruction of nine 42-ft. post-tensioned prestressed concrete beams. These tests were performed to secure data which would serve as a basis of comparison for the detrimental effects of long-time plastic flow, fatigue, fire, and corrosion. Project NY 430 030-4. NCEREL M-103.

TEXTILES AND TEXTILE PRODUCTS

Development of fabrics for USAF summer uniforms using synthetic fibers, by Rama Maxwell Ellis, Jr. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jul 1952. 22p graphs, tables (1 fold). Order from CTS. 75 cents. PB 111763

"Dacron", a polyester fiber, was chosen as the principal constituent in this investigation because of its unusual properties. The manner in which this fiber would react when used in a uniform fabric and when blended with other fibers could not be

determined by laboratory methods; hence the service wear test. AF WADC TR 52-112.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Engineering design factors for laminated aircraft windshields, by J. S. Islinger. Armour Research Foundation, Chicago, Ill. Order separate parts described below from LC, giving PB number of each part ordered.

Part I: Delineation of design factors. Apr 1954. 142p drawings (part fold), diagrs, fold graphs, tables (part fold). Mi $7.20, ph $22.80. PB 119163

This report summarizes the work done toward establishing and formulating engineering design factors pertaining to electrically heated three-ply and multi-ply laminated glass aircraft windshields. Service conditions pertinent to the design of such windshields are delineated and magnitudes of applicable data are established. Maximum and minimum heat transfer rates for the prevention of ice-formation are determined and the thermally and mechanically induced stresses resulting from service conditions are formulated. A generalized procedure for the design of electrically heated windshields is presented and applied to the design of three windshield specimens, two three-ply and one multi-ply. Mount designs (four three-ply and one multi-ply) for the windshields are evolved and one each is selected on the basis of mount evaluation tests for incorporation into final test assemblies. Resulting conclusions and recommendations are included. AF WADC TR 53-99, Part 1.

Part II: Evaluation of design factors. Apr 1954. 195p photos, maps, drawings, diagrs, graphs, tables (1 fold). Mi $8.70, ph $30.30. PB 118994

Evaluation of engineering design factors for laminated glass aircraft windshields was accomplished by subjecting specially designed windshields to a series of tests conducted under simulated service conditions. The evaluation program consisted of a series of thermal, mechanical and optical tests. The data presented augments and supports the formulated factors and will permit designers to adapt the methods to specific windshield applications with a sufficient degree of assurance that the design will perform adequately under given operational conditions. AF WADC TR 53-99, Part 2.

Correlation of the thermodynamic and electrical characteristics of blast-cooled aircraft generators. U. S. Naval Research Laboratory. Order separate parts described below from LC, giving PB number of each part ordered.

Part I: Background information and present state of the art, by D. Friedman and Dale H. Scott. Sep 1955. 20p graphs. Mi $2.40, ph $3.30. PB 119116

Empirical equations are presented which can be used to predict the electrical rating, air flow, and heat dissipation of aircraft generators for the wide range of conditions encountered in modern aircraft. Included in this report is a brief discussion of: (a) the factors involved in the experimental evaluation of aircraft generators, (b) the factors to be considered in the preparation of altitude rating charts, and (c) thermal transient-response time. NRL R 4609.

Part II: Experimental evaluation of a General Electric 15-KVA narrow-speed-range generator (Model 2CM212A2), by Daniel Friedman. Oct 1955. 36p graphs, fold tables. Mi $3, ph $6.30. PB 119114

The results of an experimental evaluation of the thermodynamic and electrical characteristics of a General Electric 2CM212A2 generator are presented. Equations and charts are developed which can be used to predict the electrical rating, air flow, and heat dissipation for the wide range of conditions encountered in modern aircraft. A short discussion of the transient thermal characteristics is included. NRL R 4610.

Laboratory investigation of an autopilot utilizing a mechanical linkage with a dead spot to obtain an effective rate signal, by Ernest C. Seaberg. U. S. National Advisory Committee for Aeronautics. Dec 1955. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119129

1. Pilots, Automatic - Tests 2. NACA TN 3602.

Technique for simulating sampled data control systems, by Ernie Ruterman and Joseph Femia. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N. Y. Aug 1955. 18p diagrs, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 119000

One important class of feedback control systems is the sampled-data system. By using the techniques developed in this system, programs for digital or

numerical devices, which are inherently of a sampled nature, can be designed in a direct manner. This report describes the method in which a digital differential analyzer was used to simulate this sampled data control system. AF RADC TN 55-6.

Engines and Propellers

Design and performance study of small gas turbines up to 1000-shaft horsepower, by O. E. Balje and E. O. A. Naumann. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Equipment Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Aug 1953. 68p fold diagr, graphs. Order from LC. Mi $3.90, ph $10.80. PB 119105

The study is based upon the use of radial type turbine and compressor units, without heat exchangers. Optimum efficiencies to be expected for net shaft horsepower outputs from 10 to 1000 horsepower are theoretically established by calculations based upon known losses encountered in actual practice. Design data for attaining the optimum overall efficiencies are presented in graphical form to cover the complete horsepower range, for three different arrangements of compressor, burner, and turbine units. Derivations of formulae which were used in the determination of performance and design data are also included. AF WADC TR 53-342.

Training and Training Devices

Light plane as a pre-primary selection and training device. III: Analysis of selection data, by Eli S. Flyer and Lawrence R. Bigbee. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 19p graphs, tables. Order from LC. Mi $2, ph $2.75. PB 117829

Project no. 7701, Task no. 77023. For Part II see PB 116009.
1. Personnel, Flying - Training 2. Personnel, Flying - Ability tests 3. Personnel, Flying - Psychological records 4. AAF PTRC TR 54-125.

Airports and Airways

Temperature above an airport runway on a hot day: Moist climate, by Arnold H. Glaser. Texas. Agricultural and Mechanical College. Dept. of Oceanography, College Station, Texas. Oct 1955. 36p graphs. Order from LC. Mi $3, ph $6.30 PB 119112

Hot weather temperature measurements made over concrete runways surrounded by lush vegetation at Houma, Louisiana, show that the air above the runways is at best heated but slightly above temperatures over the surroundings, and in some cases is cooler than the air over the surroundings. Scientific report no. 4 under Contract AF 19(604)-997. A & M project 85. Reference 55-39T. See also PB 117635. AF CRC TN 55-672.

Aerodynamics

Comparison of the spanwise loading calculated by various methods with experimental loadings obtained on a 45° sweptback wing of aspect ratio 8.02 at a Reynolds number of 4.0×10^6, by William C. Schneider. U. S. National Advisory Committee for Aeronautics. 1954. 13p diagrs, graphs, table. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 119013

Supersedes RM L 51G30.
1. Wings, Sweptback - Aerodynamics 2. Wings, Sweptback - Loading - Calculations 3. Wings, Sweptback - Spanload distribution - Calculations 4. Loads, Aerodynamic - Theory 5. Reynolds number - Effect 6. NACA 1208.

Experimental investigation at low speed of effects of fuselage cross section on static longitudinal and lateral stability characteristics of models having 0° and 45° sweptback surfaces, by William Letko and James L. Williams. U. S. National Advisory Committee for Aeronautics. Dec 1955. 45p drawings, diagrs, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119127

1. Wings, Sweptback - Stability - Effect of fuselage 2. Stability, Lateral - Static tests 3. Stability, Longitudinal - Static tests 4. NACA TN 3551.

Flight investigation at Mach numbers from 0.8 to 1.5 to determine the effects of nose bluntness on the total drag of two fin-stabilized bodies of revolution, by Roger G. Hart. U. S. National Advisory Committee for Aeronautics. Dec 1955. 11p photos, drawings, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119130

1. Mach number - Effect 2. Bodies of revolution - Drag - Effect of nose design 3. Noses (Aircraft) - Drag effect 4. NACA TN 3549.

Performance and boundary-layer data from 12° and 23° conical diffusers of area ratio 2.0 at Mach numbers up to choking and Reynolds numbers up to 7.5×10^6, by Barney Hugh Kittle, Jr. and Stafford W. Wilbur. U. S. National Advisory Committee for Aeronautics. 1954. 25p diagrs, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 119100

1. Mach number - Effect 2. Reynolds number - Effect 3. Flow, Subsonic - Theory 4. Flow, Turbulent - Theory 5. Flow, Subsonic - Pressure distribution 6. Flow, Turbulent - Pressure distribution 7. Diffusers, Subsonic - Pressure distribution 8. Diffusers - Aerodynamics 9. Boundary layer - Aerodynamics 10. NACA 1201.

Papers presented at the sixth meeting of the wind tunnel and model testing panel, Paris, France, 2-6 Nov 1954. Advisory Group for Aeronautical Research and Development. 1954. 443p photos, drawings, diagrs, graphs, tables (Text in English and French). Order free from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119097

Contents: Calibration of test sections and accuracy of measurements in wind tunnel, by Henry Girerd. - Requirements for uniformity of flow in supersonic wind tunnels, by D. E. Morris and K. G. Winter. - Calibration of the flow in the working section of the 3 ft. x 3 ft. tunnel, by D. E. Morris. - Flow direction measurements in supersonic wind tunnels, by D. J. Raney. - Scale effects at high subsonic and transonic speeds, and methods for fixing boundary-layer transition in model experiments, by A. B. Haines, D. W. Holder, and H. H. Pearcey. - Methods of determination and of fixing boundary-layer transition on wind tunnel models at supersonic speeds, by K. G. Winter, J. B. Scott-Wilson, and F. V. Davies. - Identification and starting of the transition, by Ph. Poisson-Quinton and J. P. Chevallier. - Transonic wind tunnel development of the National Advisory Committee for Aeronautics, by H. Julian Allen. - Some aspects of the behavior of perforated transonic wind tunnel walls, by P. F. Maeder. - Flow establishment and wall interference in transonic wind tunnels, by B. H. Goethert. - Heat transfer and skin friction investigations in the NOL hypersonic research, by Henry T. Nagamatsu. - Development of two hypersonic test facilities at the National Advisory Committee for Aeronautics, by H. Julian Allen. - Ultrahigh temperature aerodynamic testing facilities, by Lt. Col. J. A. Dodge. - Improvement of the study of spinning wind tunnel, by A. Martinot-Lagarde and J. Gobeltz. - Design and operating techniques of vertical spin tunnels, by A. I. Neihouse. - Vertical spinning tunnel at the National Aeronautical Establishment, by A. E. Clarke and R. L. Maltby. AG 17/P7.

Papers presented during the traveling seminar, Palais de Chaillot, Paris, 16 Jun-16 Jul 1954. Advisory Group for Aeronautical Research and Development. 1954. 81p photos, drawings, diagrs, graphs (Text in English and French). Order free from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119095

Contents: Three-dimensional flow in axial turbomachines with large free stream vorticity, by W. D. Rannie. - Discrete vortices in the transition range of flow in a pipe, by John R. Weske. - Development and tests of a 4 x 4 inch corner nozzle for the Mach number range 1.4 to 4.0, by Arnold M. Kuethe. - Problems and experimental techniques in hypersonic aerodynamics, by Antonio Ferri. - La dessication des souffleries supersoniques, by J. Smolderen. - High-speed flutter, by Lee Arnold. - Gust generation experiments, by J. D. Schetzer. - Le problème des matèriaux pour hautes tempèratures en construction aeronautique, by Pol Duwez.

Studies of the lateral-directional flying qualities of a tandem helicopter in forward flight, by Kenneth B. Amer and Robert J. Tapscott. U. S. National Advisory Committee for Aeronautics. 1954. 17p photos, drawings, graphs. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 119101

Supersedes NACA TN 2984 (PB 110835).
1. Helicopters - Aerodynamics 2. Helicopters - Flight tests 3. Helicopters - Stability 4. Helicopters - Rotors, Tandem - Control 5. Helicopters - Rotors, Tandem - Stability 6. NACA TN 2984, Revised 7. NACA 1207.

Theoretical and experimental investigation of the aeroelastic behavior of low-aspect-ratio wings, by Herbert M. Voss, Garabed Zartarian, and Pao-Tan Hsu. Massachusetts Institute of Technology. Dept. of Aeronautical Engineering. Jun 1953. 99f photos, diagrs, graphs, tables. Order from LC. Mi $5.40, enl pr $16.80. PB 119051

Details of design of an oscillator unit capable of producing horizontal, simple-harmonic motion are presented, along with the attendant electrical equipment for measuring and recording the force input and resultant motion. The philosophy and construction of two low-aspect-ratio models are given. Test results are given for a narrow, spanwise-rigid, triangular wing. Contract NOa(s) 51-109-C.

Rockets and Jet Propulsion

Problem of reducing the speed of a jet transport in flight, by Don D. Davis, Jr. U. S. National Advisory Committee for Aeronautics. Dec 1955. 22p graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119128

1. Airplanes, Jet propelled - Deceleration
2. NACA TN 3613.

Marine Transportation

Choptank River winter cruise for period 7 Dec-10 Dec 1952, by D. W. Pritchard. Johns Hopkins University. Chesapeake Bay Institute. Dec 1954. 43p map, tables. Order from LC. Mi $3.30, ph $7.80. PB 119037

Data report 24. Reference 54-11.
1. Sea water - Chemical analysis 2. Sea water - Salinity 3. Sea water - Temperature 4. Contract Nonr 248(20).

Functional research on aircraft carriers, by Douglas Courtney. Research Associates, Philadelphia, Pa. Revised. Jan 1955. 103p. Order from LC. Mi $5.70, ph $16.80. PB 118997

The purpose of this study is to determine the feasibility of meeting practical fleet problems in the operation of aircraft carriers through intensive research studies directed at these problems. Preliminary report under Contract Nonr-1413(00). RA report #1, Project A, 15 Nov 1954. Revised, 15 Jan 1955.

International committee reports, discussions and conclusions, edited by H. F. Nordström and Hans Edstrand. International Conference on Ship Hydrodynamics, 7th, 20-31 Aug 1954. 1955. 334p photos, drawings, graphs (1 fold), tables. Order from LC. Mi $11.10, ph $51.35. Also available from Gumperts Förlag, Göteberg, Sweden, 25 kronor. PB 119070

Technical committee reports and contributions to the formal discussions are recorded in full. Free discussions which followed the prepared contributions at each session are summarized. Discussions are on the following subjects: Scale effects on propellers and on self-propulsion factors, skin friction and turbulence stimulation, comparative propeller tests, seagoing qualities of ships, resistance and propulsion data. Scandinavian Towing Tank Conference. Publication no. 1. Sweden. Statens Skeppsprovningsanstalt, Göteborg, Sweden. Meddelanden nr. 34.

Patuxent River winter cruise for period 3 Dec-7 Dec 1952, by D. W. Pritchard. Johns Hopkins University. Chesapeake Bay Institute. Dec 1954. 50p map, tables. Order from LC. Mi $3.30, ph $7.80. PB 119036

Data report 23. Reference 54-10.
1. Sea water - Chemical analysis 2. Sea water - Salinity 3. Sea water - Temperature 4. Contract Nonr-248(20).

Recent deep temperature measurements in the North American basin, by L. V. Worthington and W. G. Metcalf. Woods Hole Oceanographic Institution, Woods Hole, Mass. Oct 1955. 6p table. Order from LC. Mi $1.80, ph $1.80. PB 119133

The table constitutes the principal body of data on the bottom temperatures in the North American Basin obtained by the Woods Hole Oceanographic Institution during a two year period. The table includes only those observations in which an accuracy of $\pm$ 0.01° was believed to have been obtained. Unpublished manuscript. WHOI Ref 55-54. Contract N6 onr-27701 (NR 083-004).

Two-year evaluation of cathodic protection on Charleston group reserve fleet vessels, by L. J. Waldron. U. S. Naval Research Laboratory. Aug 1955. 21p photo, diagrs, graph, tables. Order from LC. Mi $2.70, ph $4.80. PB 119014

After two years of protection all vessels had fouled badly, their paint had deteriorated, and they contained varying amounts of scattered surface rusting. However, no serious pitting was observed on any of them. Cathodic protection was judged to have been 70 to 90 percent effective in reducing general hull corrosion. Good potential control was obtained on all vessels during the two-year period. The distribution of potentials is shown diagrammatically. Final report. NRL R 4587.

MISCELLANEOUS

Analysis of selected foreign-trade zones in Germany and Sweden: Their nature, their significance in the regional relationships of their associated seaports, and their role in the international trade of their host countries, by Richard S. Thoman. Chicago. University. Dept. of Geography, Chicago, Ill. Dec 1954. 4p. Order from LC. Mi $1.80, ph $1.80. PB 119174

1. Foreign trade zones - Germany 2. Foreign trade zones - Sweden 3. International trade 4. Contract N6 ori-02046, Task order NR 388-019/12-30-53.

Environment and formation of the Chenier plain, by W. Armstrong Price. Texas. Agricultural and Mechanical College, Dept. of Oceanography, College Station, Texas. Dec 1954. 16p maps, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 119082

The chenier plain is a belted marsh-and-ridge plain formed of shallow-based, sandy beach ridges resting on clay along a marshy or swampy, seaward facing, tidal shore, with other beach ridges stranded in the marsh behind. This report discusses chenier plains of Surinam, the Mississippi chenier plain, the Para-Amazon-Orinoco plain, and those of some other great rivers. A & M project 63. Reference 54-64T. Interim report. Contract N7 onr-48706, Task order 6, NR 388-009.

Introduction to scientific methods, an annotated bibliography, by Henry E. Guerlac, Ben-Ami Lipetz and L. Pearce Williams. Cornell University, Ithaca, N Y. 1954. 41p. Order from LC. Mi $3.30, ph $7.80. PB 119074

1. Scientific research - Bibliography 2. Scientific methods - Bibliography 3. Contract Nonr-401(02).

Ionium method of age determination, by Herbert L. Volchok and J. Laurence Kulp. Columbia University. Lamont Geological Observatory, Palisades, N. Y. Jan 1955. 171p photos, drawings, diagrs, graphs, tables. Order from LC Mi $8.10, ph $27.30. PB 119187

The ionium method of age determination, applicable to deep sea sediments over the past 400,000 years, has been studied in an attempt to define its limitations and conditions. The mathematical theory on which the method is based is given in detail as are the various techniques and measurements used in obtaining the data. These measurements include total radium and gas phase radon by low-level ionization chamber techniques, total alpha emission by scintillation counting, and absolute surface area determination by gas adsorption. These techniques were employed on a number of deep ocean cores from the Atlantic and Pacific Oceans and the Caribbean Sea. The geological theory on which the ionium method is based is discussed in some detail. Contract N6 onr-271, T. O. 18, Final report.

Pallet repair manual, by H. A. Rothe and M. Toscano. U. S. Naval Supply Research and Development Facility, Bayonne, N. J. Apr 1955. 35p photos, drawings, tables. Order from OTS. $1. PB 111755

This report is based upon a study conducted to determine the most economical method of repairing wood pallets used with materials handling equipment in the Armed Services. Examples of types of damage which cannot be economically repaired are illustrated. Project NT 003-020(z), sub-project SE 54-104. Engineering report no. 2.41821.

Research on factors influencing the intensity of bioluminescence. Annual progress report for period Feb 1, 1954-Jan 31, 1955 under Contract Nonr 1353(00), NR 165-253, by Frank H. Johnson. Princeton University. Dept. of Biology, Princeton, N. J. Jan 1955. 39p drawing, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119188

Investigation and theoretical analysis of the action of physical factors, particularly temperature and hydrostatic pressure, and of chemical factors such as organic inhibitors, narcotics, anti-cholinesterases, and quenching agents which are known to influence or might influence the intensity of bioluminescence in intact luminescent organisms of varying degrees of complexity, as well as in luminescent extracts of these organisms.

Status of scientific and industrial research in Austria, by Woodbury Willoughby. U. S. Embassy, Vienna, Austria. Nov 1954. 28p. Order from OTS. 75 cents. PB 111703

Dispatch no. 593.
1. Industrial research - Austria 2. Scientific research - Austria.

Trade routes of North Africa, by Benjamin E. Thomas. California. University. Dept. of Geography, Los Angeles, Calif. Dec 1954. 10p. Order from LC. Mi $1.80, ph $1.80. PB 119175

Annual summary report for 1954 under Contract N6 onr-27517, Task order 089-043. Includes summary results for 1951 through 1953.
1. Trade routes - North Africa 2. Traffic - Research - North Africa 3. Transportation - Geographic aspects - North Africa 4. Railroads - North Africa.

Waarnemingen langs de kust van Suriname (Observations along the coast of Surinam), by J. I. S. Zonneveld. Translated by P. Groot and W. Armstrong Price. 1954. 19p maps, diagrs, graph. Order from LC. Mi $2.40, ph $3.30. PB 119075

A and M project 63. Translated from Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap, deel 71, no. 1, p. 18-31, 1953.
1. Sediment - Analysis - Suriname 2. Physical geography - Suriname 3. Contract N7onr 48706, NR 388-009.

ATOMIC ENERGY REPORTS OF INTEREST TO INDUSTRY

The following Atomic Energy reports are listed here because of their interest and usefulness to general industry.

Reports may be purchased in accordance with instructions on the inside front cover of the U. S. GOVERNMENT RESEARCH REPORTS. As PB numbers are not indicated, order by series and number. These reports may also be consulted at any AEC Depository Library. A list of these libraries may be obtained from the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C.

Reproduction in whole or part of any report listed herein is encouraged by the U. S. Atomic Energy Commission, subject to the approval of authors or originating sites. General inquiries from the industrial press about AEC-developed information should be directed to the Industrial Information Branch, Atomic Energy Commission, Washington 25, D. C.

Biology and Medicine

Radioisotope uptake in marine organisms with special reference to the passage of such isotopes as are liberated from atomic weapons through food chains leading to organisms utilized as food by man. Annual report —1954-1955. Hawaii Marine Laboratory. University of Hawaii, Honolulu, Hawaii. Sep 1955. Contract AT(04-3)-56. 46p. Order from OTS. 35 cents. AECU-3079

Semi-annual progress report to the Division of Biology and Medicine. Utah. Univ., Salt Lake City. Radiobiology Lab. Sep 1955. Contract AT(11-1)-119. 79p. Order from LC. Mi $4.50, ph $12.30. AECU-3109

The inhalation of radioactive materials as related to hand contamination, by J. C. Bailey and R. C. Rohr. K-25 Plant. Carbide and Carbon Chemicals Co., Oak Ridge, Tenn. Sep 1953. Contract No. W-7405-Eng-26. 18p. Order from OTS. 20 cents. K-1071

Air-borne contamination resulting from transferable contamination on surfaces, by J. C. Bailey and R. C. Rohr. K-25 Plant. Carbide and Carbon Chemicals Co., Oak Ridge, Tenn. Nov 1953. Contract No. W-7405-Eng-26. 12p. Order from OTS. 15 cents. K-1088

Radium and mesothorium poisoning and dosimetry and instrumentation techniques in applied radioactivity. Annual progress report. Massachusetts Institute of Technology, Cambridge, Mass. May 1955. Contract AT(30-1)-952. 68p. Order from OTS. 45 cents. NYO-4663

Cloud chamber for counting condensation nuclei in aerosols, by Bernard G. Saunders. Oak Ridge National Laboratory, Oak Ridge, Tenn. Oct 1955. Contract No. W-7405-eng-26. 29p. Order from OTS. 25 cents. ORNL-1957

Chemistry and Chemical Engineering

Adsorption properties of virgin and irradiated graphite, by C. N. Spalaris. Hanford Atomic Products Operation, Richland, Wash. Nov 1954. Contract No. W-31-109-Eng-52. 85p. Order from OTS. 45 cents. AECD-3679

Analytical studies on the estimation of beryllium oxide in beryllium metal, by J. Rynasiewicz. Knolls Atomic Power Lab., Schenectady, N. Y. Apr 1951. Contract W-31-109-Eng-52. 14p. Order from LC. Mi $2.40, ph $3.30. AECD-3710 Decl. with deletions Nov 1955.

Physical properties of the halogen fluorides and of halogen fluoride—hydrogen fluoride systems. I. Vapor pressures of halogen fluoride—hydrogen fluoride systems. II. Solid-liquid equilibria in halogen fluoride—hydrogen fluoride systems. III. Densities of halogen fluoride—hydrogen fluoride solutions. IV. Electrical conductivities of the halogen fluorides and their hydrogen fluoride solutions. V. Magnetic susceptibilities of the halogen fluorides, by Max T. Rogers, John L. Speirs, H. Bradford Thompson, and Morton B. Panish. Michigan State Coll., East Lansing. Aug 1954. Contract AT(11-1)-151. 171p. Order from LC. Mi $8.10, ph $27.30. AECU-2960

Decay scheme of In^{107}, by Wayne A. Gassatt, Jr. and W. Wayne Meinke. Michigan. Univ., Ann Arbor. 1955. Contract AT(11-1)-70. 13p. Order from LC. Mi $2.40, ph $3.30. AECU-3069

The reaction of chlorine with aromatic compounds under intense gamma irradiation, by David E. Harmer. University of Michigan, Ann Arbor, Michigan. May 1955. Contract No. AT(11-1)-162. 130p. Order from OTS. 65 cents. AECU-3077

The electronic energy levels and the mass spectrum of methane. Technical report no. 4, by Morris Krauss, Austin L. Wahrhaftig, and Henry Eyring.

Utah. Univ., Salt Lake City. Jul 1954. Contract AT(11-1)-82. 64p. Order from LC. Mi $3.90, ph $10.80. AECU-3081

The mass spectra of large molecules. III. Metastable ions from propane and the mass spectrum of 2,2 di-deuteropropane. Technical report no. 7, by Allen Kropf, Austin L. Wahrhaftig, and Henry Eyring. Utah. Univ., Salt Lake City. Jul 1954. Contract AT(11-1)-82. 30p. Order from LC. Mi $2.70, ph $4.80. AECU-3082

Vapor and liquid phase reactions between nitrogen dioxide and water, by M. S. Peters and J. L. Holman. Illinois. Univ., Urbana. 1954. Contract AT(11-1)-276. 18p. Order from LC. Mi $2.40, ph $3.30. AECU-3083

The spectrophotometric determination of dissociation constants of dibasic acids. Methods using a minimum amount of data, by Burton J. Thamer. Los Alamos Scientific Lab., N. Mex. 1954. Contract W-7405-eng-36. 12p. Order from LC. Mi $2.40, ph $3.30. AECU-3084

Infrared spectra and structure of the crystalline sodium acetate complexes of U(VI), Np(VI), Pu(VI), and Am(VI). A comparison of metal—oxygen bond distance and bond force constant in this series, by Llewellyn H. Jones. Los Alamos Scientific Lab., N. Mex. 1954. Contract W-7405-eng-36. 10p. Order from LC. Mi $1.80, ph $1.80. AECU-3088 Decl. Jan 1955.

Physical properties of the halogen fluorides. IV. The iodine pentafluoride—hydrogen fluoride system. Solid-liquid equilibria, vapor pressures, molar volumes, and specific conductances, by Max T. Rogers, John L. Speirs, and Morton B. Panish. Michigan State Coll., Lansing. Kedzie Chemical Lab. 1955? Contract AT(11-1)-151. 11p. Order from LC. Mi $2.40, ph $3.30. AECU-3095

Physical properties of the halogen fluorides. VI. The chlorine trifluoride—hydrogen fluoride system. Some vapor pressure and conductance measurements, by Max T. Rogers, John L. Speirs, and Morton B. Panish. Michigan State Coll., East Lansing. Kedzie Chemical Lab. 1955. Contract AT(11-1)-151. 3p. Order from LC. Mi $1.80, ph $1.80. AECU-3097

The mass spectrum of methane and the energy levels of the fragment ions and radicals, by Morris Krauss, Austin L. Wahrhaftig, and Henry Eyring. Utah. Univ., Salt Lake City. Jul 1955. Contract AT(11-1)-82. 88p. Order from LC. Mi $4.80, ph $13.80. AECU-3106

Production of Pu^{246} in the MTR, by Herbert Diamond and Raymond F. Barnes. Argonne National Laboratory, Lemont, Ill. Nov 1954. Contract W-31-109-eng-38. 6p. Order from OTS. 15 cents. ANL-5361

The behavior of uranium, thorium, and other selected materials in bromine trifluoride, bromine pentafluoride, chlorine trifluoride, and fluorine at elevated temperatures, by Lawrence Stein and Richard C. Vogel. Argonne National Laboratory, Lemont, Ill. May 1955. Contract W-31-109-eng-38. 20p. Order from OTS. 20 cents. ANL-5441

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